DISCRETE SEMICONDUCTORS

DATA HANDBOOK

BOOK SC06 1989

High-voltage and Switching Power transistors Supplement to SC06

Philips Components

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SUPPLEMENT TO SC06:
HIGH–VOLTAGE SWITCHING AND POWER TRANSISTORS

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INTRODUCTION

This supplement to SC06, High-voltage switching and power transistors, contains details of types that are missing from the current 1989 edition. For information regarding rating systems, transistor ratings, letter symbols, SOAR, mounting instructions and accessories, please refer to the relevant sections of the main handbook.

SELECTION GUIDE

type	V_{CEO} (V)	I_C (mA)	P_{tot} (W)	envelope
BF419	250	100	6	TO-126
BF457	160	100	6	TO-126
BF458	250	100	6	TO-126
BF459	300	100	6	TO-126
BF469	250	50	1.8	TO-126
BF470	−250	−50	1.8	TO-126
BF471	−	50	1.8	TO-126
BF472	−	−50	1.8	TO-126
BF583	250	50	1.6	TO-202
BF584	−250	−50	1.6	TO-202
BF585	300	50	1.6	TO-202
BF586	−300	−50	1.6	TO-202
BF587	350	50	1.6	TO-202
BF588	−350	−50	1.6	TO-202
BF591	170	150	1.3	TO-202
BF593	210	150	1.3	TO-202
BF819	250	100	6	TO-202
BF857	160	100	6	TO-202
BF858	250	100	6	TO-202
BF859	300	100	6	TO-202
BF869	250	50	5	TO-202
BF870	−250	−50	5	TO-202
BF871	−	50	5	TO-202
BF872	−	−50	5	TO-202
BU806	200	8000	60	TO-220AB
BU807	150	8000	60	TO-220AB
BU806F	200	8000	28	SOT186
BU806AF	180	8000	28	SOT186
BU807F	150	8000	28	SOT186

TYPE NUMBER SURVEY

type	polarity	page
BF419	npn	15
BF457	npn	21
BF458	npn	21
BF459	npn	21
BF469	npn	27
BF470	pnp	35
BF471	npn	27
BF472	pnp	35
BF583	npn	43
BF584	pnp	47
BF585	npn	43
BF586	pnp	47
BF587	npn	43
BF588	pnp	47
BF591	npn	51
BF593	npn	51
BF819	npn	55
BF857	npn	63
BF858	npn	63
BF859	npn	63
BF869	npn	69
BF870	pnp	75
BF871	npn	69
BF872	pnp	75
BU806	npn	81
BU807	npn	81
BU806F	npn	85
BU806AF	npn	85
BU807AF	npn	85

DEVICE DATA

in alphanumerical sequence

HIGH–VOLTAGE TRANSISTOR

Silicon n-p-n transistor in TO-126 plastic envelope intended for use as a driver for line output transistors in colour tv receivers.

QUICK REFERENCE DATA

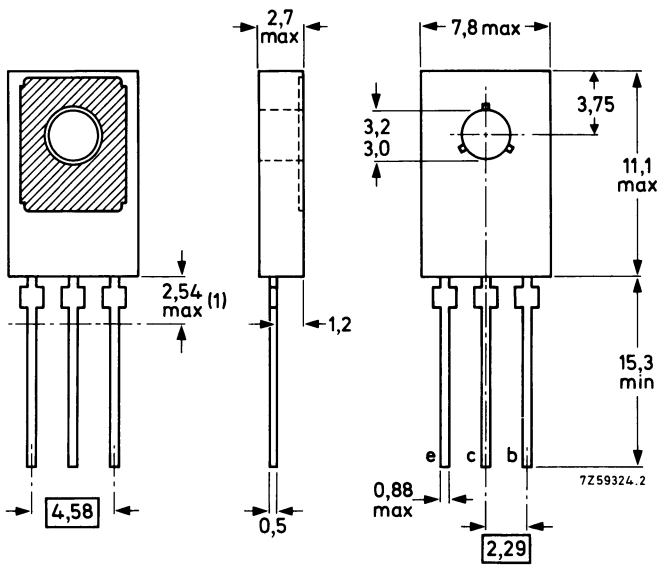
Collector-base voltage (open emitter)	V_{CBO}	max.	300	V
Collector-emitter voltage (open base)	V_{CEO}	max.	250	V
Collector current (peak value)	I_{CM}	max.	300	mA
Total power dissipation up to T_{mb} = 90 °C	P_{tot}	max.	6	W
Junction temperature	T_j	max.	150	°C
D.C. current gain I_C = 20 mA; V_{CE} = 10 V	h_{FE}	typ.	45	
Storage time	t_s	typ.	0.5	μs

MECHANICAL DATA

Dimensions in mm

Fig.1 TO-126 (SOT-32)

Collector connected to mounting base



(1) Within this region the cross-section of the leads is uncontrolled

See also chapters Mounting Instructions and Accessories.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	300	V
Collector-emitter voltage ($R_{BE} \leqslant 1$ kΩ)	V_{CER}	max.	300	V
Collector-emitter voltage (open base)	V_{CEO}	max.	250	V
Emitter-base voltage (open collector)	V_{EBO}	max.	5	V
Collector current (continuous)	I_C	max.	100	mA
Collector current (peak value) *	I_{CM}	max.	300	mA
Total power dissipation up to $T_{mb} = 90$ °C	P_{tot}	max.	6	W
up to $T_{amb} = 70$ °C	P_{tot}	max.	0.8	W
Storage temperature	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	10	K/W
From junction to ambient	$R_{th\ j\text{-}a}$	=	100	K/W

* Precautions should be taken during switch-on of the BF419 where an overshoot of current is likely to occur. The amplitude of the overshoot depends on the relative magnitude of stray external capacities to the transistor collector capacity. It is desirable to keep the stray capacities to a minimum by short lead lengths etc. so as to minimise the area of the switching path.

CHARACTERISTICS

T_j = 25 °C

Collector cut-off current				
I_E = 0; V_{CB} = 250 V	I_{CBO}	<	50	nA
Emitter cut-off current				
I_C = 0; V_{EB} = 3 V	I_{EBO}	<	50	nA
D.C. current gain				
I_C = 20 mA; V_{CE} = 10 V	h_{FE}	typ.	45	
Collector-emitter saturation voltage				
I_C = 200 mA; I_B = 20 mA *	V_{CEsat}	<	11	V
Collector output capacitance at f = 1 MHz				
I_E = 0; V_{CB} = 30 V	C_{Tc}	<	4.5	pF
Storage time				
(in the typical circuit below)	t_s	typ.	0.5	μs

* The BF419 is controlled to V_{CEsat} max. 11.0 V and is thermally stable under all operating conditions where T_j max of 150 °C is not exceeded. For the typical circuit shown below, a heatsink is not required for operation with $T_{amb} \leqslant 70$ °C.

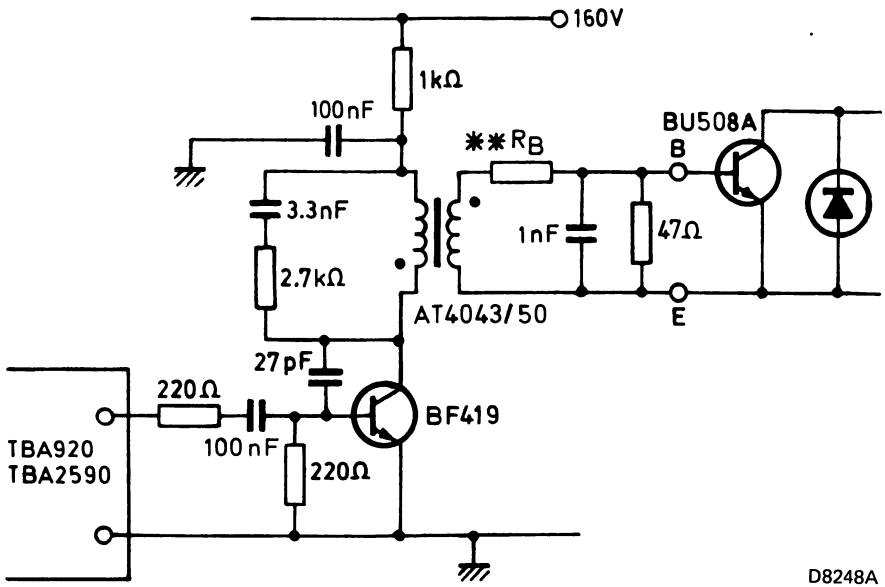


Fig.2 Typical circuit.

** R_B is chosen so that the end-of-scan base current for the BU508A is 1.4 A under nominal conditions. Typical value of R_B is 0.5 Ω plus 0.1 Ω lead resistance.

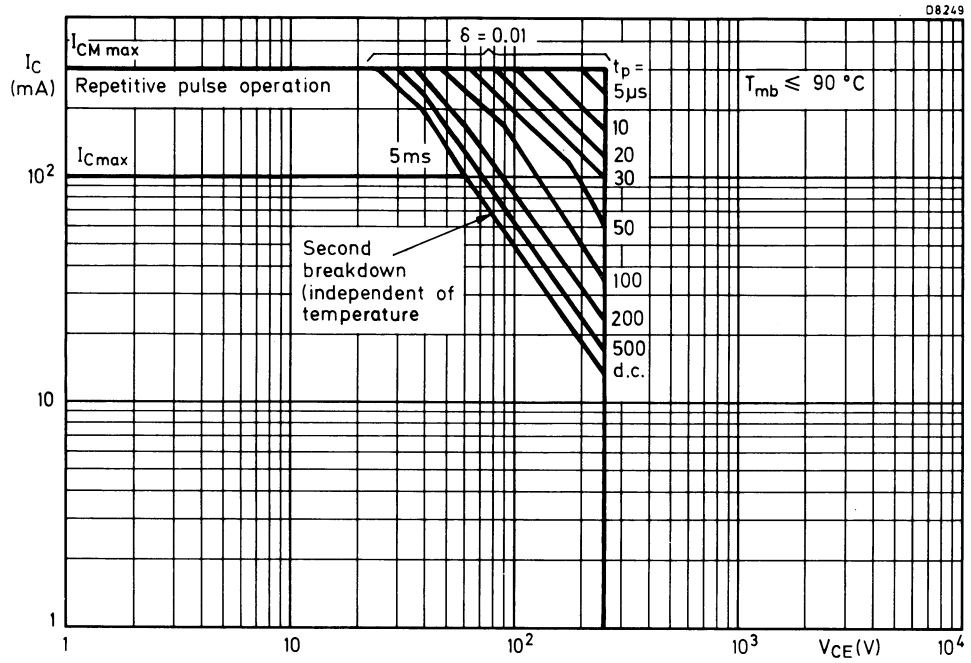


Fig.3 Safe Operating AReas with the transistor forward biased.

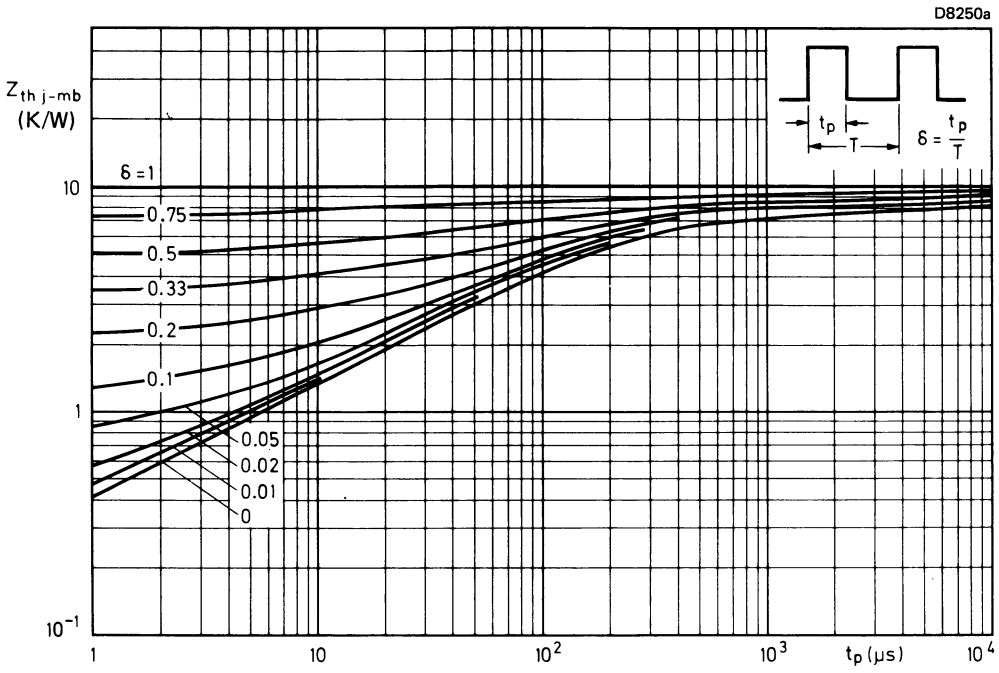


Fig. 4.

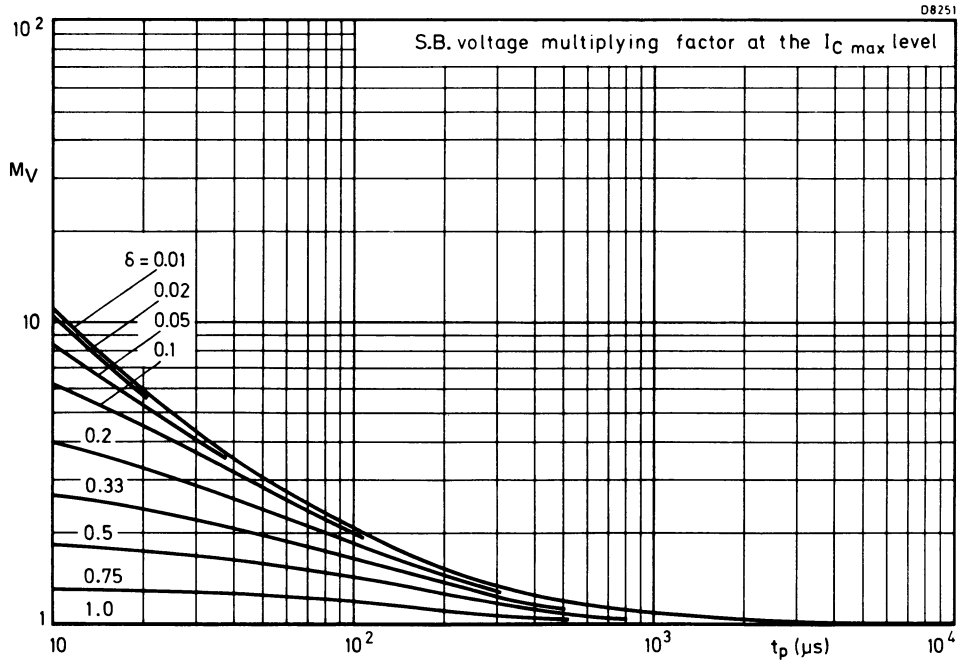

D8251
S.B. voltage multiplying factor at the $I_{C\ max}$ level
M_V
10^2
10
1
δ = 0.01
0.02
0.05
0.1
0.2
0.33
0.5
0.75
1.0
10
10^2
10^3
t_p (μs)
10^4

Fig. 5.

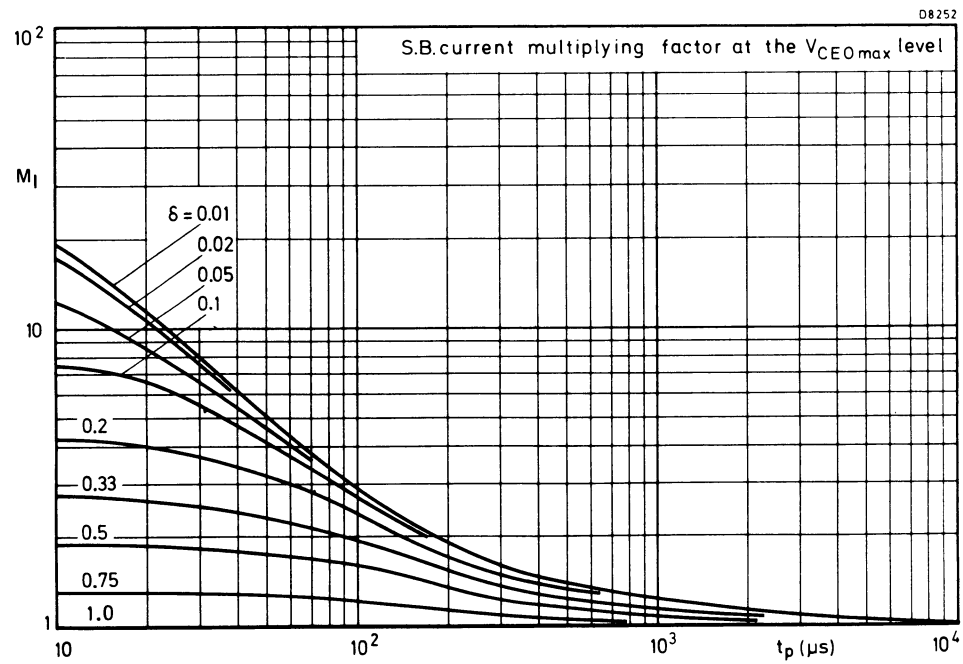

D8252
S.B. current multiplying factor at the $V_{CEO\ max}$ level
M_I
10^2
10
1
δ = 0.01
0.02
0.05
0.1
0.2
0.33
0.5
0.75
1.0
10
10^2
10^3
t_p (μs)
10^4

Fig. 6.

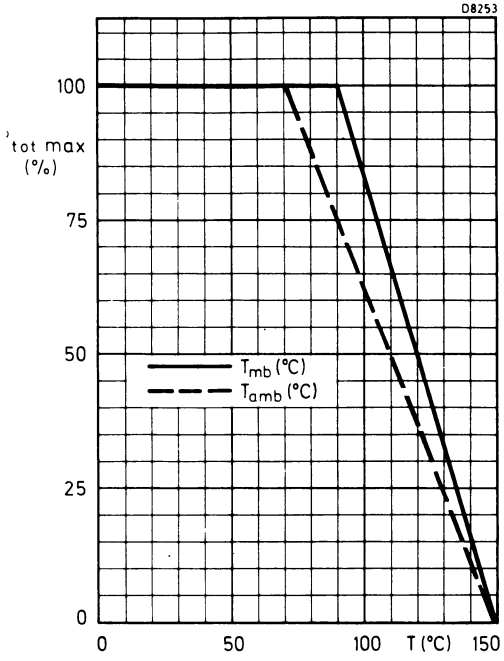


Fig. 7.

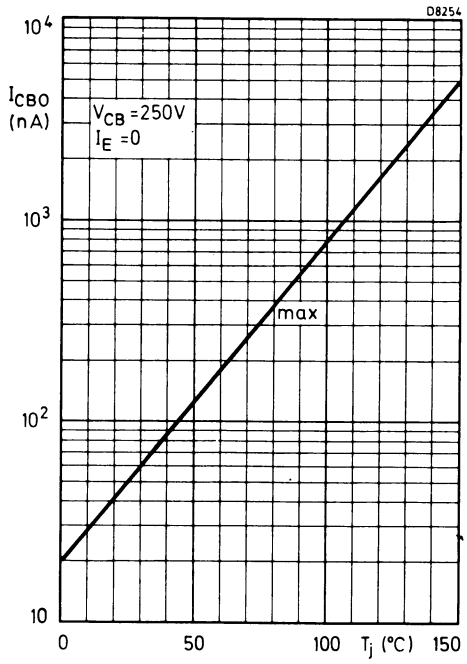


Fig. 8.

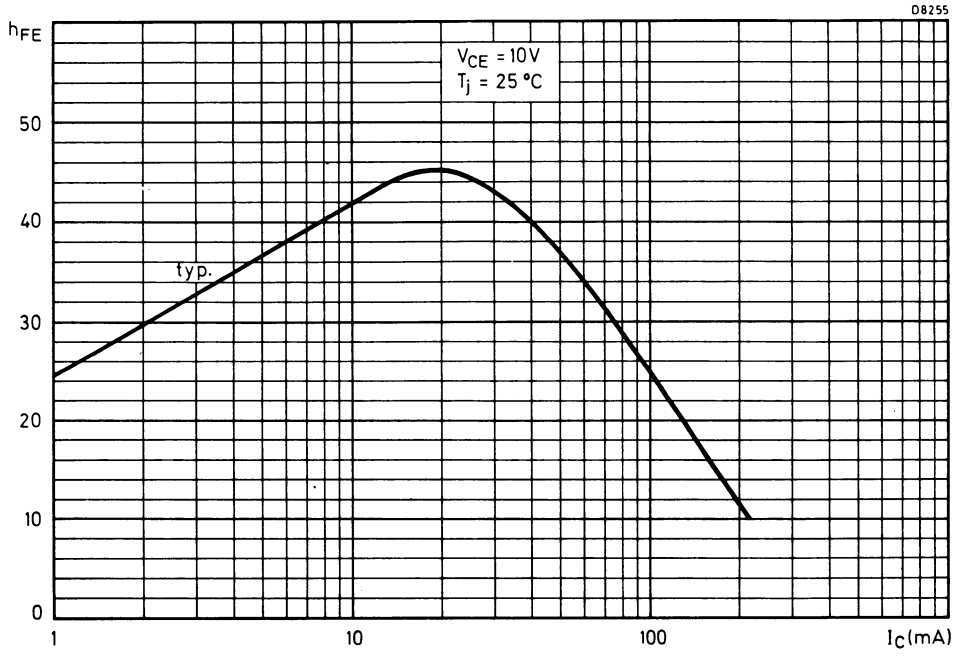


Fig. 9.

SILICON PLANAR TRANSISTORS

for video output stages

N-P-N transistors in a SOT-32 plastic envelope intended for video output stages in black-and-white and in colour television receivers.

QUICK REFERENCE DATA

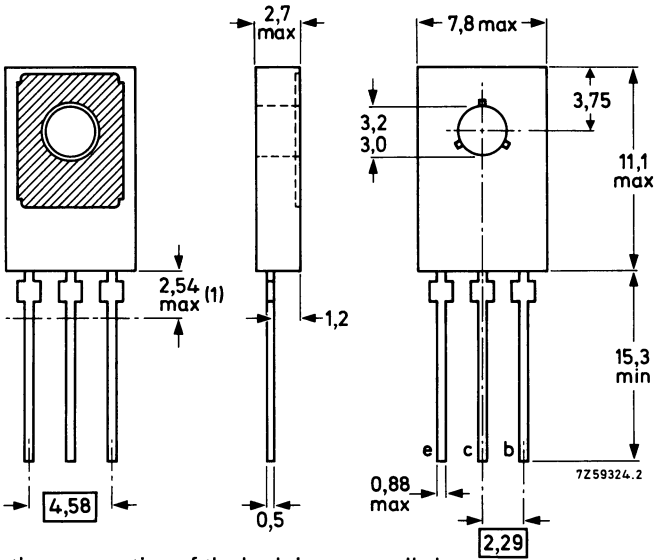
			BF457	BF458	BF459	
Collector-base voltage (open emitter)	V_{CBO}	max.	160	250	300	V
Collector-emitter voltage (open base)	V_{CEO}	max.	160	250	300	V
Collector current (peak value)	I_{CM}	max.		300		mA
Total power dissipation up to T_{mb} = 90 °C	P_{tot}	max.		6		W
Junction temperature	T_j	max.		150		°C
D.C. current gain at T_j = 25 °C I_C = 30 mA; V_{CE} = 10 V	h_{FE}	>		26		
Transition frequency I_C = 15 mA; V_{CE} = 10 V	f_T	typ.		90		MHz
Feedback capacitance at f = 1 MHz I_E = 0; V_{CB} = 30 V	C_{re}	<		3,5		pF

MECHANICAL DATA

Dimensions in mm

Collector connected to metal part of mounting surface

TO-126 (SOT-32)



(1) Within this region the cross-section of the leads is uncontrolled.

See also chapters Mounting instructions and Accessories.

RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

			BF457	BF458	BF459	
Collector-base voltage (open emitter)	V_{CBO}	max.	160	250	300	V
Collector-emitter voltage (open base)	V_{CEO}	max.	160	250	300	V
Emitter-base voltage (open collector)	V_{EBO}	max.	5	5	5	V

Collector current (d.c.)	I_C	max.	100	mA
Collector current (peak value)	I_{CM}	max.	300	mA
Base current (d.c.)	I_B	max.	50	mA
Total power dissipation up to T_{mb} = 90 °C	P_{tot}	max.	6	W
Storage temperature	T_{stg}	−55 to +150		°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

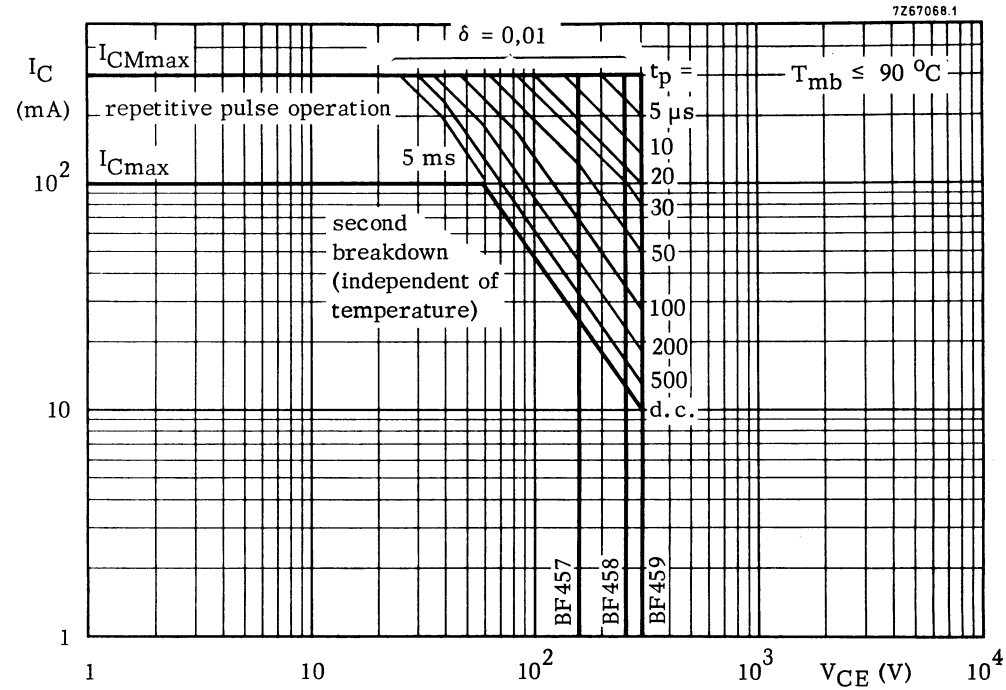
From junction to ambient	$R_{th\ j\text{-}a}$	=	104	K/W
From junction to mounting base	$R_{th\ j\text{-}mb}$	=	10	K/W

CHARACTERISTICS $T_j = 25\ ^oC$ unless otherwise specified

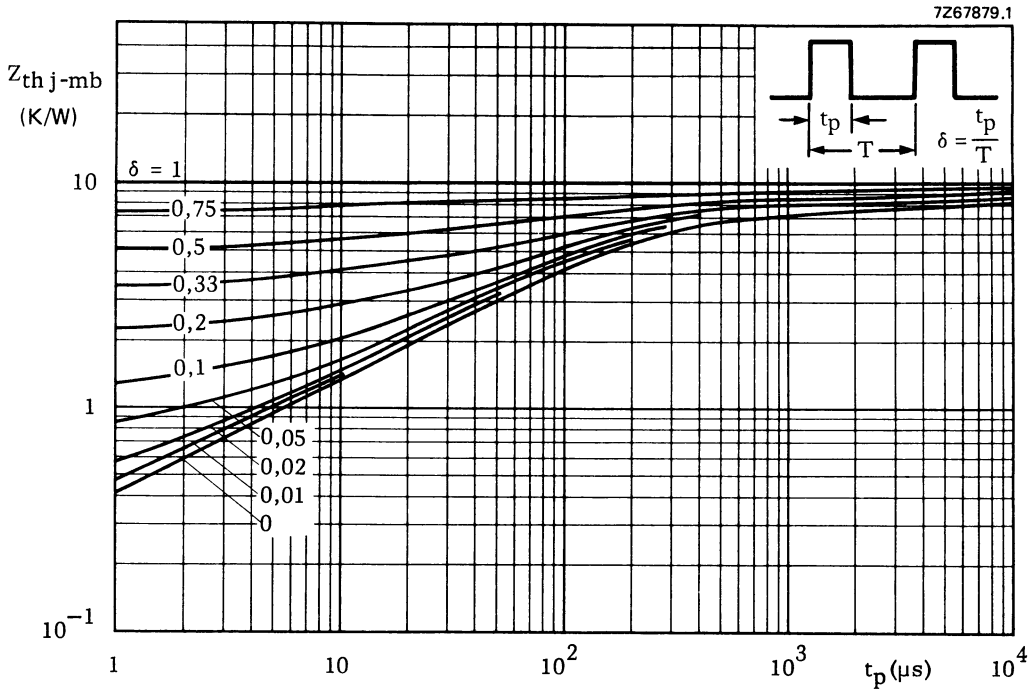
Collector cut-off current				
$I_E = 0$; $V_{CB} = 100$ V for BF457 $I_E = 0$; $V_{CB} = 200$ V for BF458 $I_E = 0$; $V_{CB} = 250$ V for BF459	I_{CBO}	<	50	nA
Emitter cut-off current				
$I_C = 0$; $V_{EB} = 3$ V	I_{EBO}	<	50	nA
D.C. current gain				
$I_C = 30$ mA; $V_{CE} = 10$ V	h_{FE}	>	26	
Collector-emitter saturation voltage				
$I_C = 30$ mA; $I_B = 6$ mA	V_{CEsat}	<	1	V
High frequency knee voltage at $T_j = 150\ ^oC$				
$I_C = 50$ mA	V_{CEK}	typ.	15	V

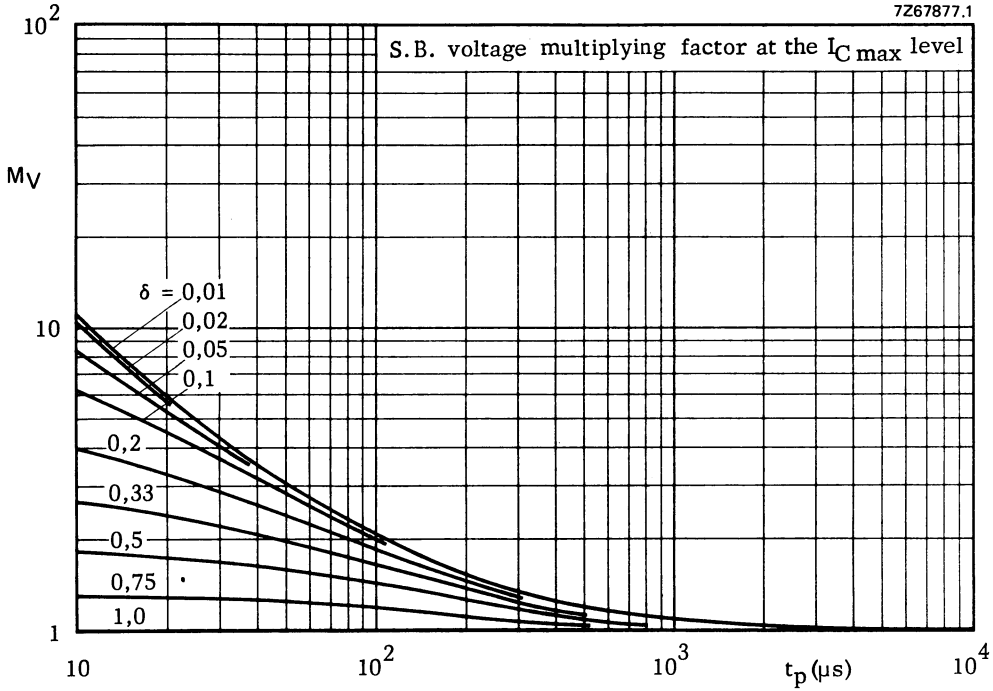
The high frequency knee voltage of a transistor is that value of the collector-emitter voltage at which the small signal gain, measured in a practical circuit, has dropped to 80% of the gain at $V_{CE} = 50$ V. A further reduction of the collector-emitter voltage results in a rapid increase of the distortion of the signal.

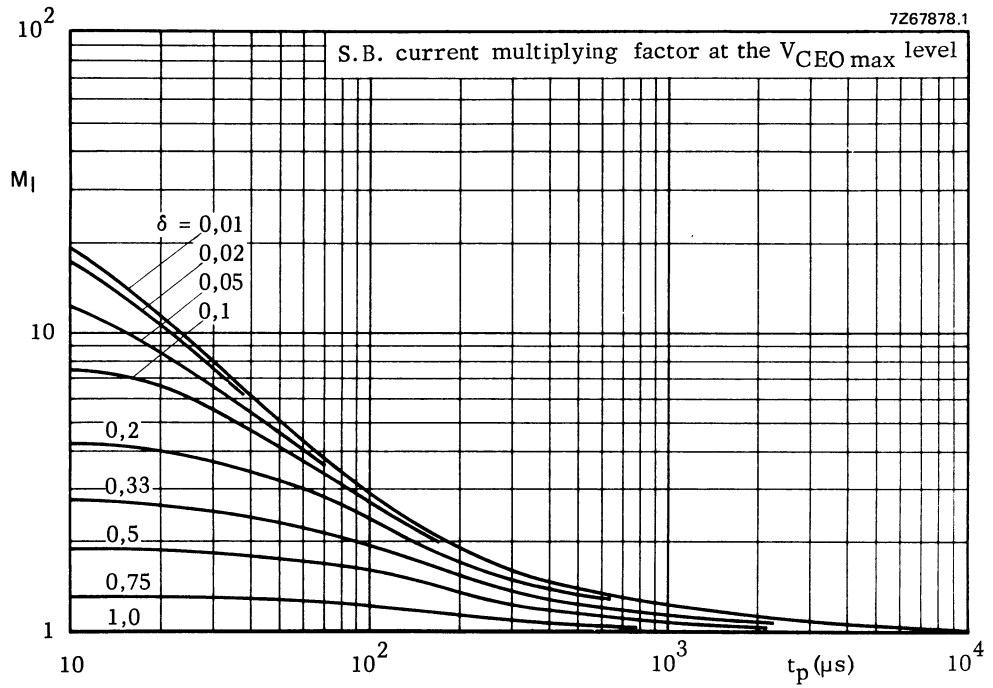
Transition frequency at f = 100 MHz				
$I_C = 15$ mA; $V_{CE} = 10$ V	f_T	typ.	90	MHz
Feedback capacitance at f = 1 MHz				
$I_E = 0$; $V_{CB} = 30$ V	C_{re}	<	3,5	pF
Output capacitance at f = 1 MHz				
$I_E = 0$; $V_{CB} = 30$ V	C_{oe}	<	4,5	pF

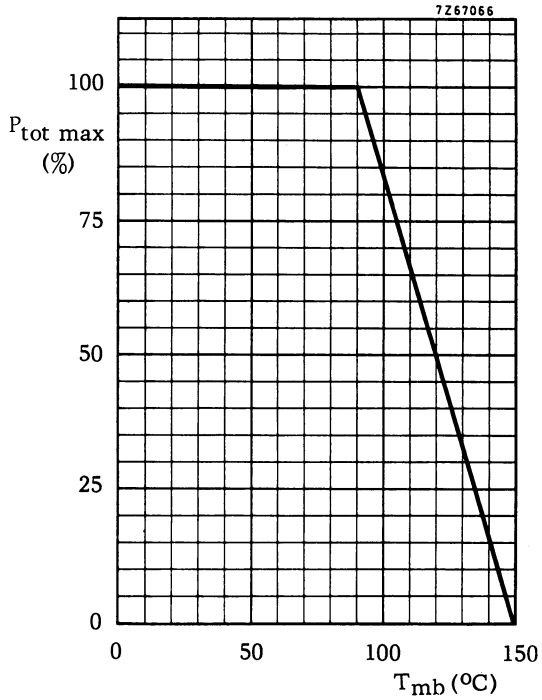


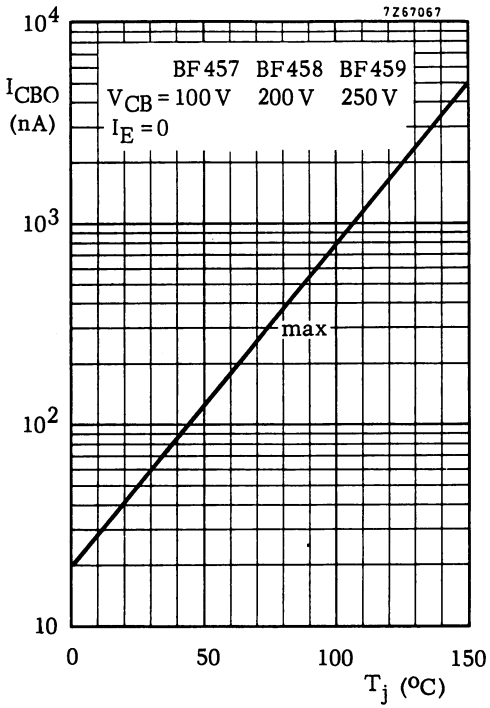
Safe Operating Area with the transistor forward biased




7Z67877.1
S.B. voltage multiplying factor at the $I_{C\,max}$ level
M_V
10^2
10
1
δ = 0,01
0,02
0,05
0,1
0,2
0,33
0,5
0,75
1,0
10
10^2
10^3
t_p (μs)
10^4


7Z67878.1
S.B. current multiplying factor at the $V_{CEO\,max}$ level
M_I
10^2
10
1
δ = 0,01
0,02
0,05
0,1
0,2
0,33
0,5
0,75
1,0
10
10^2
10^3
t_p (μs)
10^4


7Z67066
100
$P_{tot\ max}$ (%)
75
50
25
0
0
50
100
150
T_{mb} (°C)


7Z67067
10^4
I_{CBO} (nA)
BF457 BF458 BF459
V_{CB} = 100 V 200 V 250 V
I_E = 0
10^3
max
10^2
10
0
50
100
150
T_j (°C)

SILICON PLANAR EPITAXIAL TRANSISTORS

N-P-N transistors in plastic envelope intended for class-B video output stages in television receivers and for high-voltage i.f. output stages.
P-N-P complements are BF470 and BF472 respectively.

QUICK REFERENCE DATA

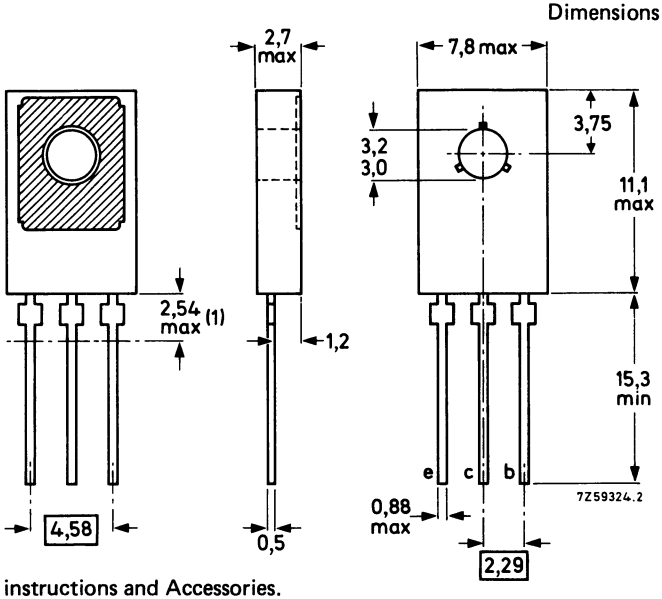
			BF469	BF471	
Collector-base voltage (open emitter)	V_{CBO}	max.	250	300	V
Collector-emitter voltage					
open base	V_{CEO}	max.	250	–	V
R_{BE} = 2,7 kΩ	V_{CER}	max.	–	300	V
Collector current (peak value)	I_{CM}	max.	100		mA
Total power dissipation up to $T_{mb} \leqslant 114$ °C	P_{tot}	max.	1,8		W
Junction temperature	T_j	max.	150		°C
D.C. current gain					
I_C = 25 mA; V_{CE} = 20 V	h_{FE}	>	50		
Transition frequency					
I_C = 10 mA; V_{CE} = 10 V	f_T	>	60		MHz
Feedback capacitance at f = 0,5 MHz					
I_E = 0; V_{CB} = 30 V	C_{re}	<	1,8		pF

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-126 (SOT-32).

Collector connected to mounting base



See also chapters Mounting instructions and Accessories.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

			BF469	BF471	
Collector-base voltage (open emitter)	V_{CBO}	max.	250	300	V
Collector-emitter voltage					
R_{BE} = 2,7 kΩ	V_{CER}	max.	–	300	V
open base	V_{CEO}	max.	250	–	V
Emitter-base voltage (open collector)	V_{EBO}	max.	5		V
Collector current (d.c.)	I_C	max.	50		mA
Collector current (peak value)	I_{CM}	max.	100		mA
Total power dissipation up to T_{mb} = 114 °C *	P_{tot}	max.	1,8		W
Storage temperature	T_{stg}		–65 to + 150		°C
Junction temperature	T_j	max.	150		°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	20	K/W
From junction to ambient in free air *	$R_{th\ j\text{-}a}$	=	100	K/W

* Transistor mounted on a printed-circuit board, maximum lead length 4 mm, mounting pad for collector lead minimum 10 mm x 10 mm.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
I_E = 0; V_{CB} = 200 V	I_{CBO}	<	10	nA
R_{BE} = 2,7 kΩ; V_{CE} = 200 V; T_j = 150 °C	I_{CER}	<	10	μA
Emitter cut-off current				
I_C = 0; V_{EB} = 5 V	I_{EBO}	<	10	μA
D.C. current gain				
I_C = 25 mA; V_{CE} = 20 V	h_{FE}	>	50	
High-frequency knee voltage at T_j = 150 °C*				
I_C = 25 mA	V_{CEK}	typ.	20	V
Transistion frequency				
I_C = 10 mA; V_{CE} = 10 V	f_T	>	60	MHz
Feedback capacitance at f = 0,5 MHz				
I_E = 0; V_{CB} = 30 V	C_{re}	<	1,8	pF

* The high-frequency knee voltage of a transistor is that value of the collector-emitter voltage at which the small-signal gain, measured in a practical circuit, has dropped to 80% of the gain at V_{CE} = 50 V.
A further reduction of the collector-emitter voltage results in a rapid increase of the distortion of the signal.

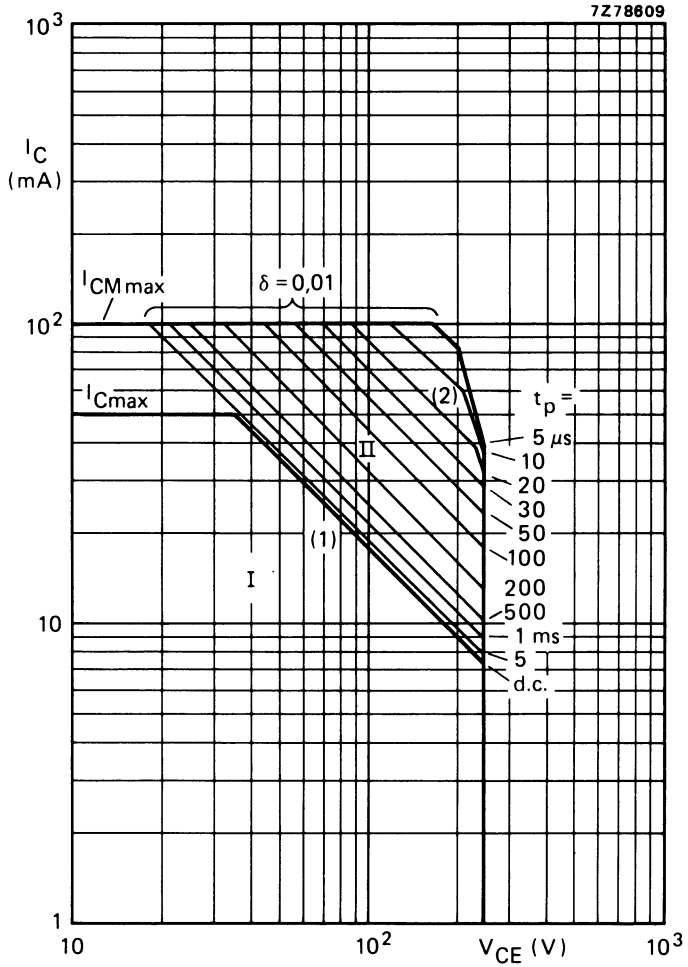


Fig. 2 Safe Operating ARea at T_{mb} = 114 °C.

I Region of permissible d.c. operation.

II Permissible extension for repetitive pulse operation.

(1) $P_{tot\,max}$ and $P_{peak\,max}$ lines.

(2) Second breakdown limits (independent of temperature).

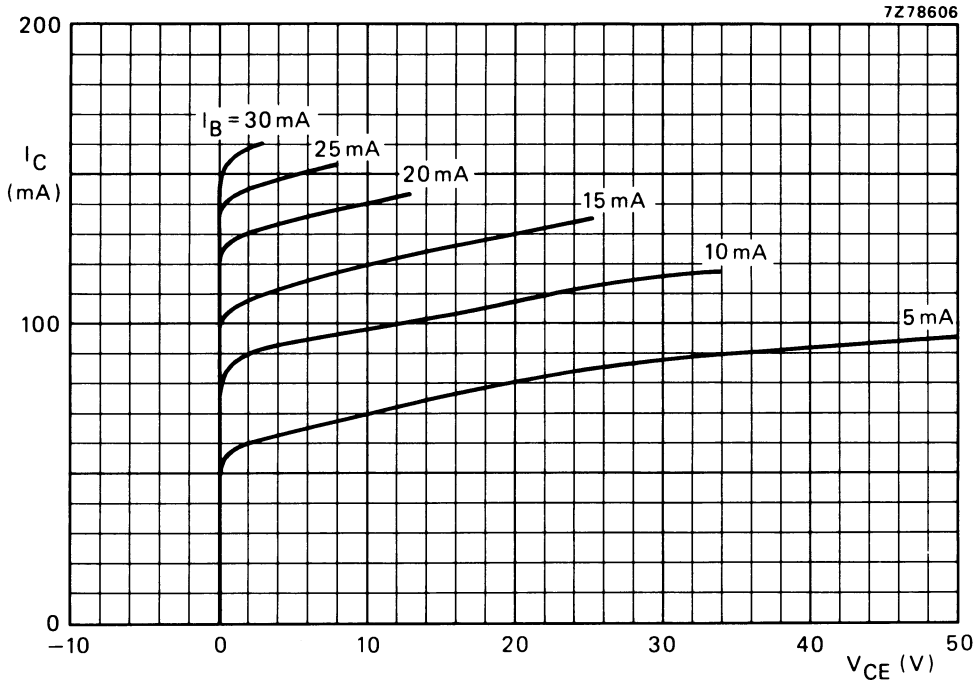


Fig. 3 T_j = 25 °C.

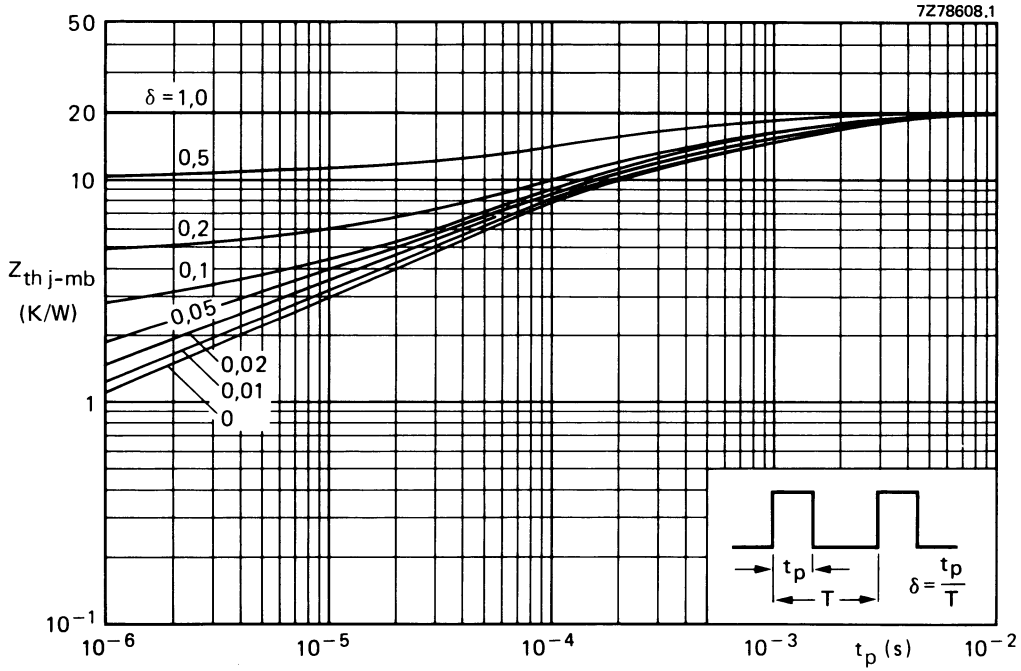


Fig. 4.

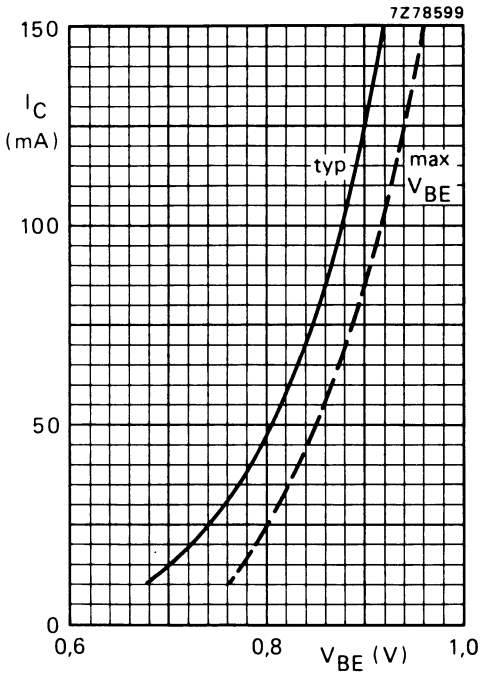


Fig. 5 V_{CE} = 20 V; T_j = 25 °C.

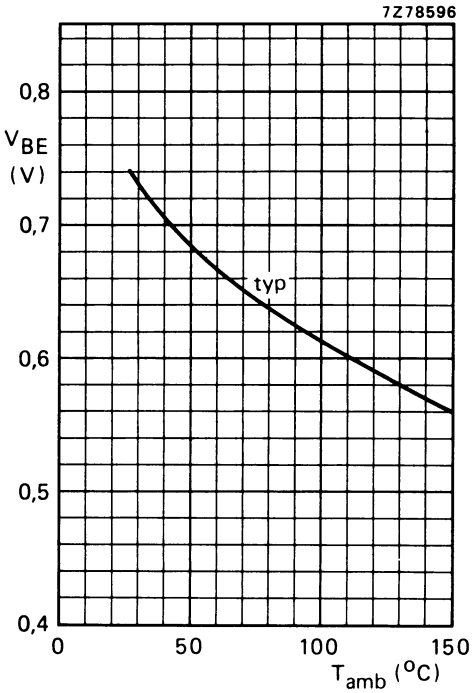


Fig. 6 I_C = 25 mA; V_{CE} = 20 V.

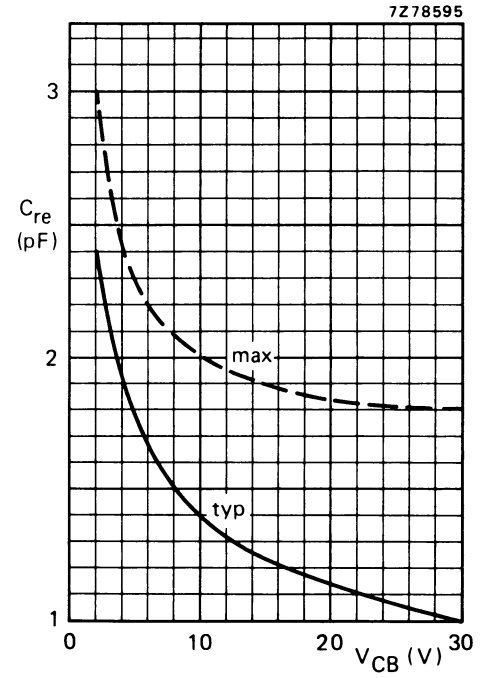


Fig. 7 I_E = 0; f = 1 MHz; T_j = 25 °C.

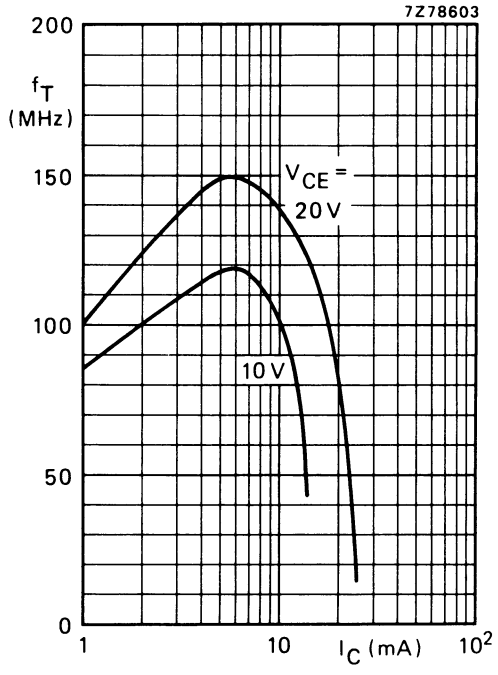


Fig. 8 f_M = 35 MHz; T_{amb} = 25 °C.

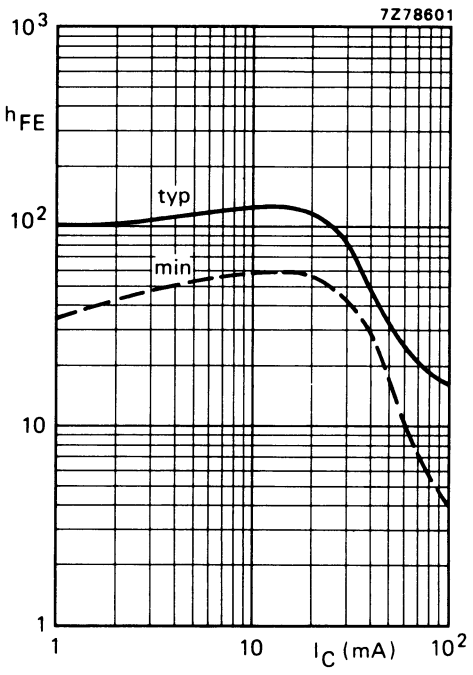


Fig. 9 V_{CE} = 20 V; T_{amb} = 25 °C.

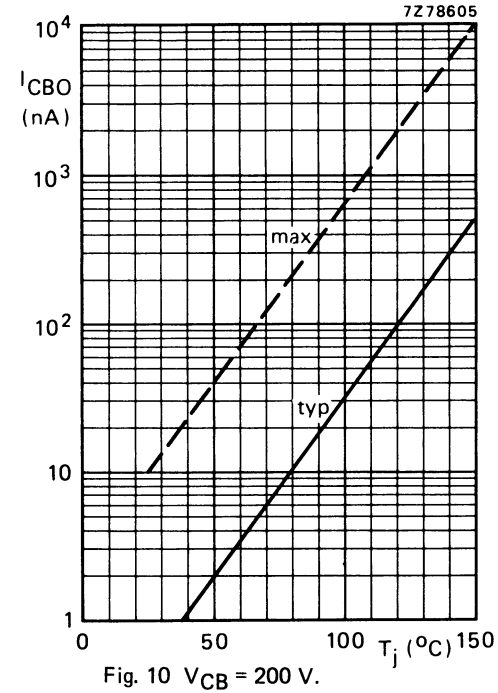


Fig. 10 V_{CB} = 200 V.

SILICON PLANAR EPITAXIAL TRANSISTORS

P-N-P transistors in a plastic envelope intended for class-B video output stages in television receivers and for high-voltage i.f. output stages.
N-P-N complements are BF469 and BF471 respectively.

QUICK REFERENCE DATA

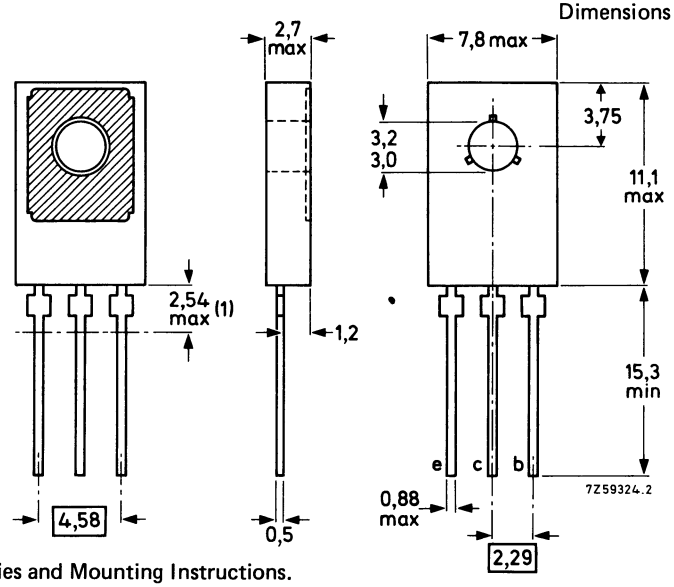
			BF470	BF472	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	250	300	V
Collector-emitter voltage					
open base	$-V_{CEO}$	max.	250	–	V
R_{BE} = 2,7 kΩ	$-V_{CER}$	max.	–	300	V
Collector current (peak value)	$-I_{CM}$	max.	100		mA
Total power dissipation up to T_{mb} = 114 °C	P_{tot}	max.	1,8		W
Junction temperature	T_j	max.	150		°C
D.C. current gain					
$-I_C$ = 25 mA; $-V_{CE}$ = 20 V	h_{FE}	>	50		
Transition frequency					
$-I_C$ = 10 mA; $-V_{CE}$ = 10 V	f_T	>	60		MHz
Feedback capacitance at f = 0,5 MHz					
I_E = 0; $-V_{CB}$ = 30 V	C_{re}	<	1,8		pF

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-126 (SOT-32).

Collector connected to mounting base.



See also chapters Accessories and Mounting Instructions.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

			BF470	BF472	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	250	300	V
Collector-emitter voltage					
R_{BE} = 2,7 kΩ	$-V_{CER}$	max.	–	300	V
open base	$-V_{CEO}$	max.	250	–	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	5		V
Collector current (d.c.)	$-I_C$	max.	50		mA
Collector current (peak value)	$-I_{CM}$	max.	100		mA
Total power dissipation up to T_{mb} = 114 °C *	P_{tot}	max.	1,8		W
Storage temperature	T_{stg}		−65 to + 150		°C
Junction temperature	T_j	max.	150		°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	20	K/W
From junction to ambient in free air *	$R_{th\ j\text{-}a}$	=	100	K/W

* Transistor mounted on a printed-circuit board, maximum lead length 4 mm; mounting pad for collector lead minimum 10 mm x 10 mm.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
I_E = 0; $-V_{CB}$ = 200 V	$-I_{CBO}$	<	10	nA
R_{BE} = 2,7 kΩ; $-V_{CE}$ = 200 V; T_j = 150 °C	$-I_{CER}$	<	10	μA
Emitter cut-off current				
I_C = 0; $-V_{EB}$ = 5 V	$-I_{EBO}$	<	10	μA
D.C. current gain				
$-I_C$ = 25 mA; $-V_{CE}$ = 20 V	h_{FE}	>	50	
High-frequency knee voltage at T_j = 150 °C*				
$-I_C$ = 25 mA	$-V_{CEK}$	typ.	20	V
Transition frequency				
$-I_C$ = 10 mA; $-V_{CE}$ = 10 V	f_T	>	60	MHz
Feedback capacitance at f = 0,5 MHz				
I_E = 0; $-V_{CB}$ = 30 V	C_{re}	<	1,8	pF

* The high-frequency knee voltage of a transistor is that value of the collector-emitter voltage at which the small-signal gain, measured in a practical circuit, has dropped to 80% of the gain at $-V_{CE}$ = 50 V. A further reduction of the collector-emitter voltage results in a rapid increase of the distortion of the signal.

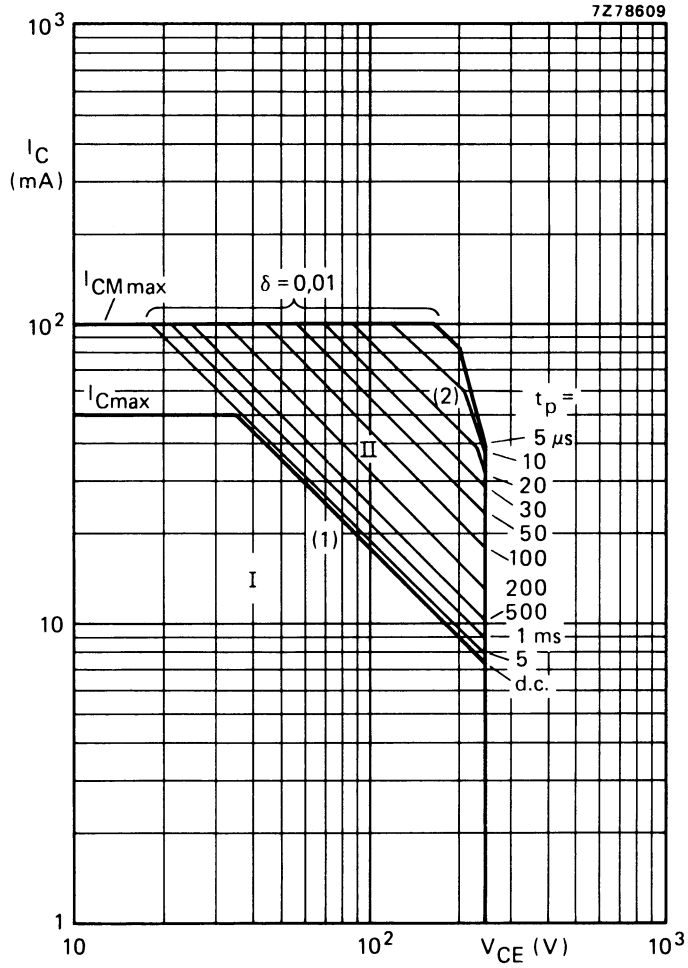


Fig. 2 Safe Operating ARea at T_{mb} = 114 °C.

I Region of permissible d.c. operation.

II Permissible extension for repetitive pulse operation.

(1) $P_{tot\,max}$ and $P_{tot\,peak\,max}$ lines.

(2) Second breakdown limits (independent of temperature).

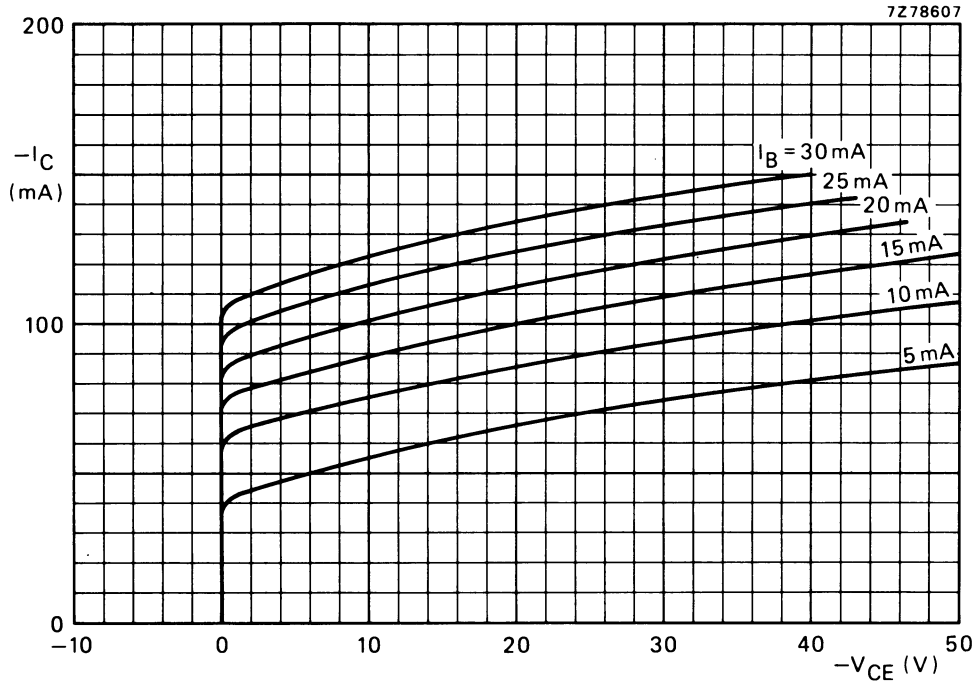


Fig. 3 T_j = 25 °C.

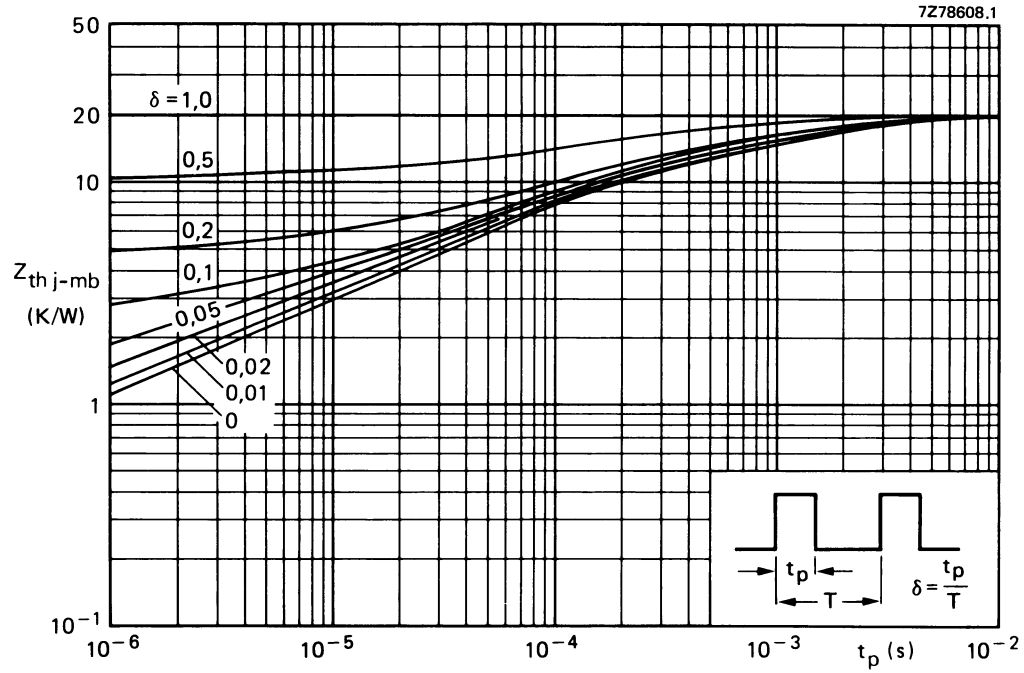


Fig. 4.

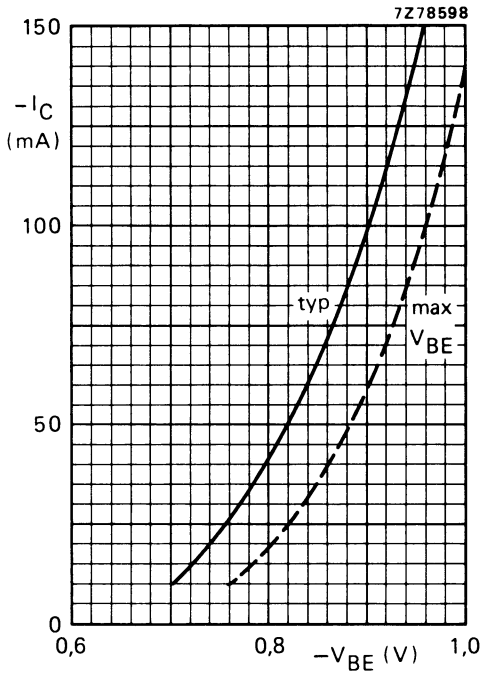


Fig. 5 $-V_{CE}$ = 20 V; T_j = 25 °C.

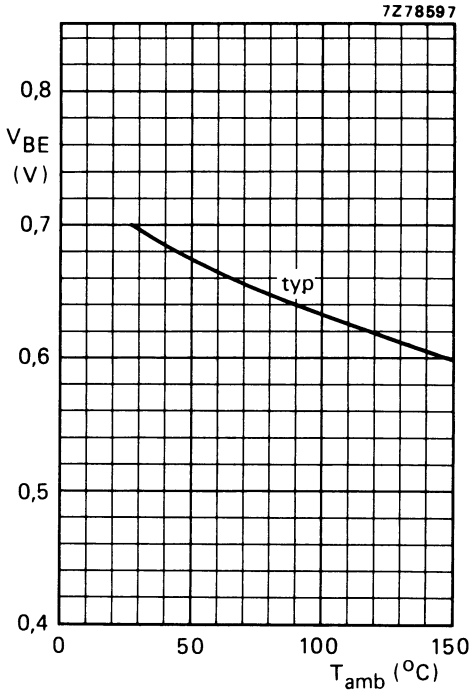


Fig. 6 $-V_{CE}$ = 20 V; $-I_C$ = 25 mA.

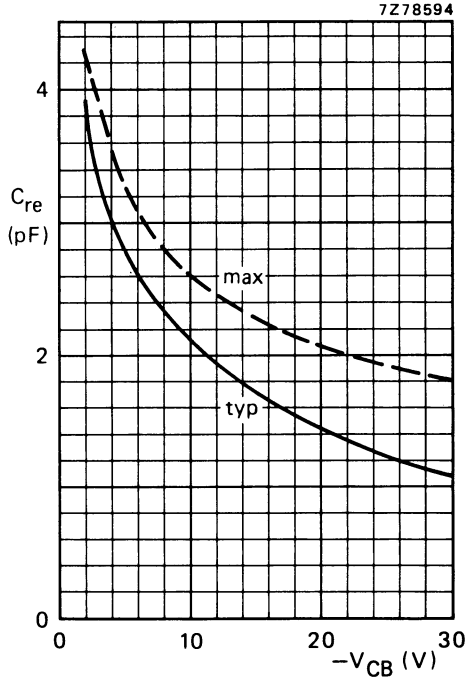


Fig. 7 I_E = 0; f = 1 MHz; T_j = 25 °C.

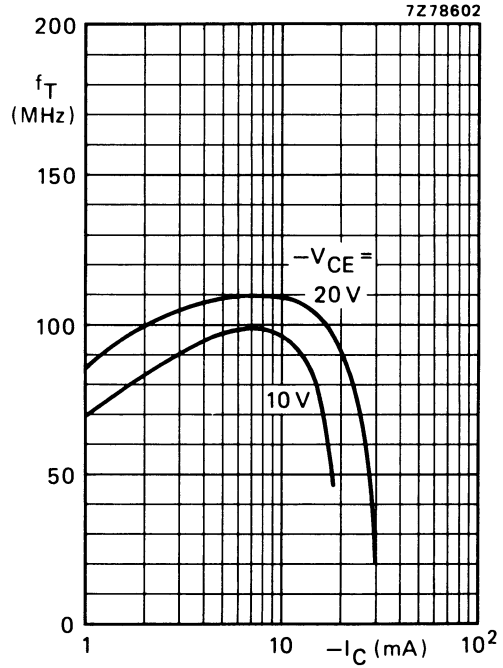


Fig. 8 f_M = 35 MHz; T_{amb} = 25 °C.

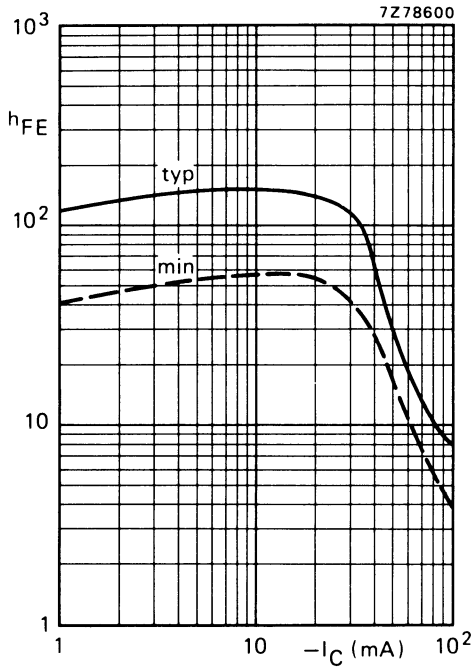


Fig. 9 $-V_{CE}$ = 20 V; T_{amb} = 25 °C.

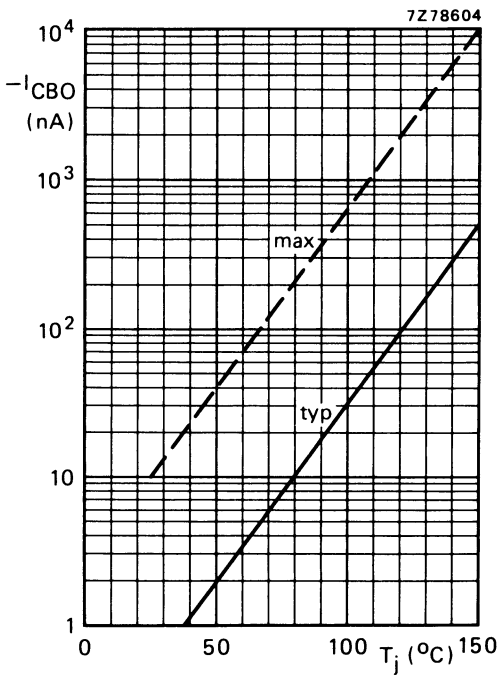


Fig. 10 $-V_{CB}$ = 200 V.

SILICON PLANAR EPITAXIAL TRANSISTORS

N-P-N transistors in TO-202 plastic envelope, intended for use in video output stages in black-and-white and in colour television receivers.

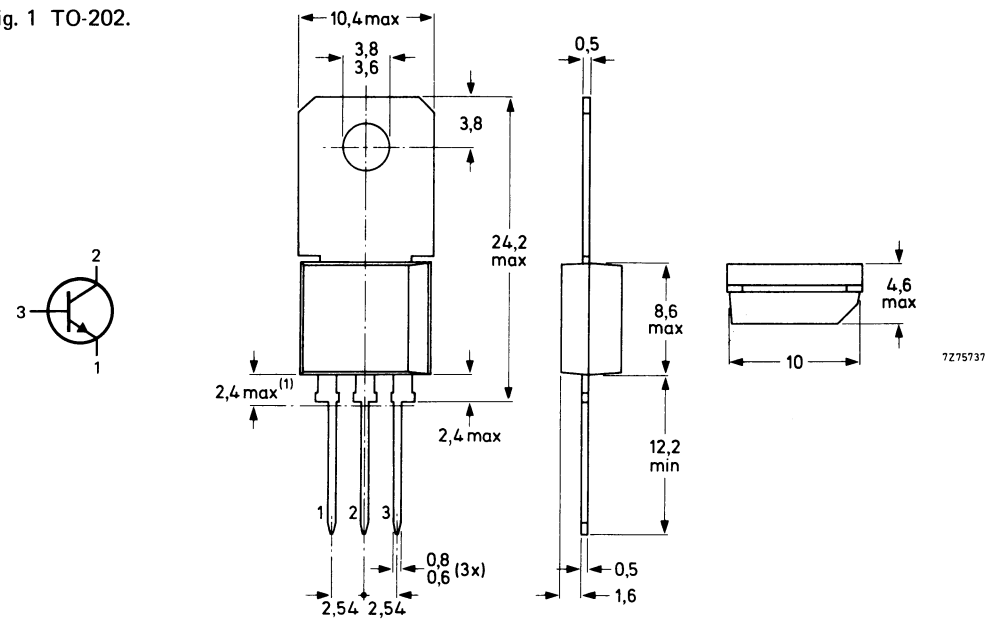
QUICK REFERENCE DATA

			BF583	BF585	BF587	
Collector-base voltage (open emitter)	V_{CBO}	max.	300	350	400	V
Collector-emitter voltage (open base)	V_{CEO}	max.	250	300	350	V
Collector current (peak value)	I_{CM}	max.		100		mA
Total power dissipation (free air)	P_{tot}	max.		1,6		W
D.C. current gain I_C = 25 mA; V_{CE} = 20 V	h_{FE}	min.		50		
Transition frequency $-I_E$ = 10 mA; V_{CB} = 10 V	f_T			70 to 110		MHz
Junction temperature	T_j	max.		150		°C

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-202.



(1) Plastic flash allowed within this zone.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

			BF583	BF585	BF587	
Collector-base voltage (open emitter)	V_{CBO}	max.	300	350	400	V
Collector-emitter voltage (open base)	V_{CEO}	max.	250	300	350	V
Emitter-base voltage (open collector)	V_{EBO}	max.		5		V
Collector current						
d.c.	I_C	max.		50		mA
peak value	I_{CM}	max.		100		mA
Total power dissipation in free air						
up to T_{amb} = 25 °C	P_{tot}	max.		1,6		W
Total power dissipation						
up to T_{mb} = 25 °C	P_{tot}	max.		5,0		W
Storage temperature	T_{stg}			−65 to + 150		°C
Junction temperature	T_j	max.		150		°C

THERMAL RESISTANCE

From junction to ambient	$R_{th\ j\text{-}a}$	max.	78	K/W
From junction to mounting base	$R_{th\ j\text{-}mb}$	max.	25	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
I_E = 0; V_{CB} = 300 V	I_{CBO}	⩽	20	nA
Collector-emitter cut-off current				
V_{CE} = 250 V; R_{BE} = 2,7 kΩ; T_j = 150 °C	I_{CER}	⩽	20	μA
Emitter cut-off current				
I_C = 0; V_{EB} = 5 V	I_{EBO}	⩽	10	μA
High-frequency knee voltage				
I_C = 25 mA; T_j = 150 °C	V_{CEK}	=	20	V
D.C. current gain				
I_C = 25 mA; V_{CE} = 20 V	h_{FE}	⩾	50	
I_C = 40 mA; V_{CE} = 20 V		⩾	20	
Transition frequency				
$-I_E$ = 10 mA; V_{CB} = 10 V	f_T		70 to 110	MHz
Feedback capacitance at f = 1 MHz				
I_E = 0; V_{CB} = 30 V	C_{re}	⩽	1,8	pF
Collector capacitance at f = 1 MHz				
I_E = 0; V_{CB} = 30 V	C_c	⩽	2,5	pF

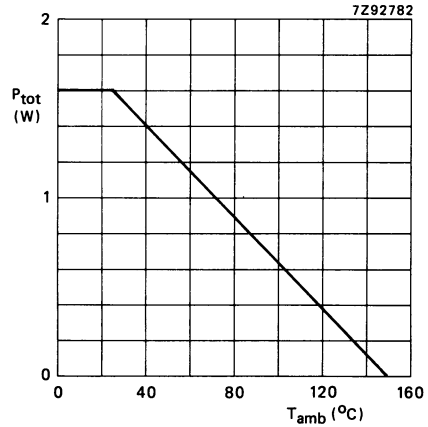


Fig. 2 Maximum permissible power dissipation.

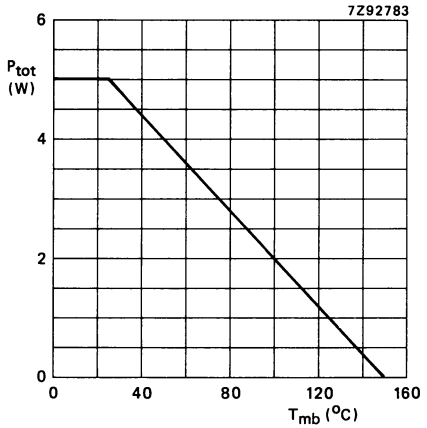


Fig. 3 Typical values.

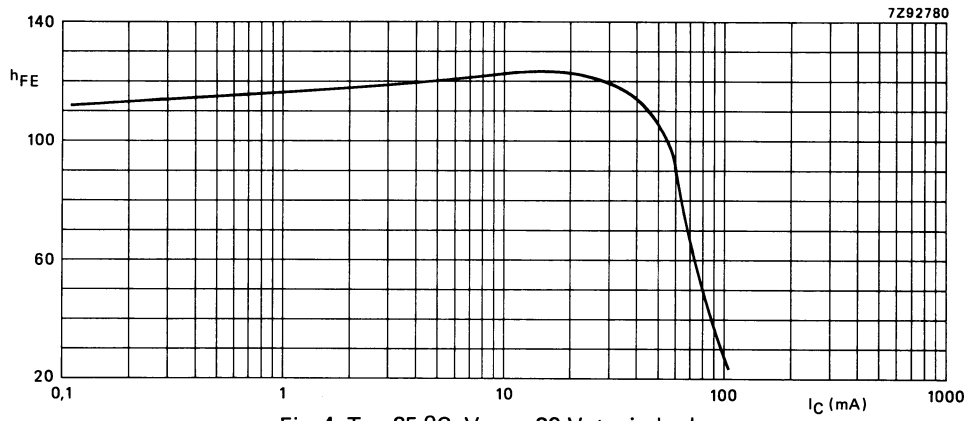


Fig. 4 T_j = 25 °C; V_{CE} = 20 V; typical values.

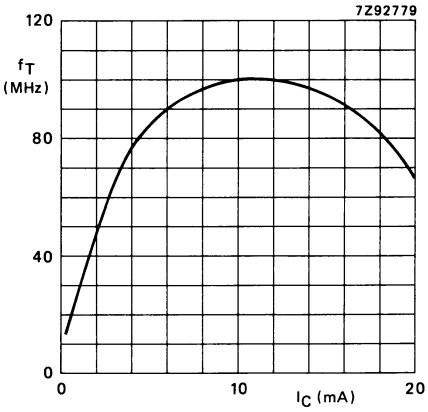


Fig. 5 V_{CE} = 10 V; f = 100 MHz; typical values.

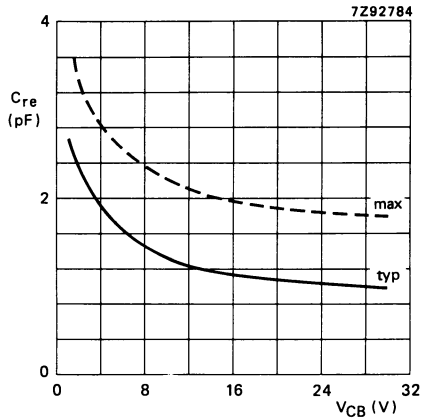


Fig. 6 I_E = 0; f = 1 MHz.

SILICON PLANAR EPITAXIAL TRANSISTORS

PNP transistors in a TO-202 plastic envelope. Intended for use in video output stages of black and white and colour television receivers.

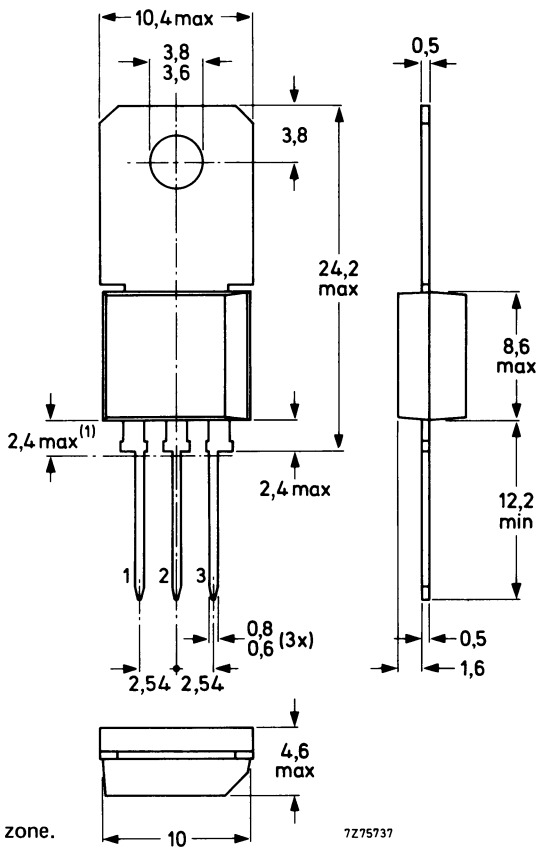
QUICK REFERENCE DATA

			BF584	BF586	BF588	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	250	300	350	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	250	300	350	V
Collector current (peak value)	$-I_{CM}$	max.		100		mA
Total power dissipation (free air)	P_{tot}	max.		1.6		W
DC current gain $-I_C$ = 25 mA; $-V_{CE}$ = 20 V	h_{FE}	min.		50		
Transition frequency $-I_C$ = 10 mA; $-V_{CE}$ = 10 V	f_T			70 to 110		MHz
Junction temperature	T_j	max.		150		°C

MECHANICAL DATA

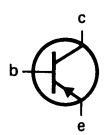
Dimensions in mm

Fig.1 TO-202.



Pinning:

1 = Emitter
2 = Collector
3 = Base



Note

1. Plastic flash allowed within this zone.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

			BF584	BF586	BF588	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	250	300	350	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	250	300	350	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.		5		V
Collector current						
DC	$-I_C$	max.		50		mA
peak value	$-I_{CM}$	max.		100		mA
Total power dissipation in free air up to T_{amb} = 25 °C	P_{tot}	max.		1.6		W
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.		5.0		W
Storage temperature range	T_{stg}			−65 to 150		°C
Junction temperature	T_j	max.		150		°C

THERMAL RESISTANCE

From junction to ambient	$R_{th\ j\text{-}a}$	max.	78	K/W
From junction to mounting base	$R_{th\ j\text{-}mb}$	max.	25	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise stated

			BF584	BF586	BF588	
Collector-emitter breakdown voltage $-I_C$ = 2.5 mA; I_B = 0	$-V_{(BR)CEO}$	min.	250	300	350	V
Collector-base breakdown voltage $-I_C$ = 10 μA; I_E = 0	$-V_{(BR)CBO}$	min.	250	300	350	V
Collector cut-off current						
I_E = 0; $-V_{CB}$=200 V	$-I_{CBO}$	max.	20			nA
I_E = 0; $-V_{CB}$=250 V	$-I_{CBO}$	max.		20		nA
I_E = 0; $-V_{CB}$=300 V	$-I_{CBO}$	max.			20	nA
Emitter-base breakdown voltage $-I_E$ = 10 μA; I_C = 0	$-V_{(BR(EBO}$	min.		5		V
Collector-emitter cut-off current $-V_{CE}$ = 200 V; R_{BE} = 2.7 kΩ; T_j = 150 °C	$-I_{CER}$	max.		20		μA
Emitter cut-off current I_C = 0; $-V_{EB}$ = 5 V	$-I_{EBO}$	max.		10		μA
High frequency knee voltage $-I_C$ = 25 mA; T_j = 150 °C	$-V_{CEK}$	=		15		V

DC current gain				
$-I_C = 25$ mA; $-V_{CE} = 20$ V	h_{FE}	min.	50	
$-I_C = 40$ mA; $-V_{CE} = 20$ V	h_{FE}	min.	20	
Collector-emitter saturation voltage				
$-I_C = 20$ mA; $-I_B = 2$ mA	$-V_{CEsat}$	max.	0.5	V
Base-emitter saturation voltage				
$-I_C = 20$ mA; $-I_B = 2$ mA	$-V_{BEsat}$	max.	0.9	V
Transition frequency at f = 100 MHz				
$-I_C = 10$ mA; $-V_{CE} = 10$ V	f_T		70 to 110	MHz
Feedback capacitance at f = 1 MHz				
$I_E = 0$; $-V_{CB} = 30$ V	C_{re}	max.	2.2	pF
Output capacitance at f = 1 MHz				
$I_E = 0$; $-V_{CB} = 30$ V	C_{ob}	max.	3.0	pF

SWITCHING TRANSISTORS FOR TELEPHONY APPLICATIONS

Silicon n-p-n transistors in a TO-202 outline, intended for use in PABX and similar telephone systems.

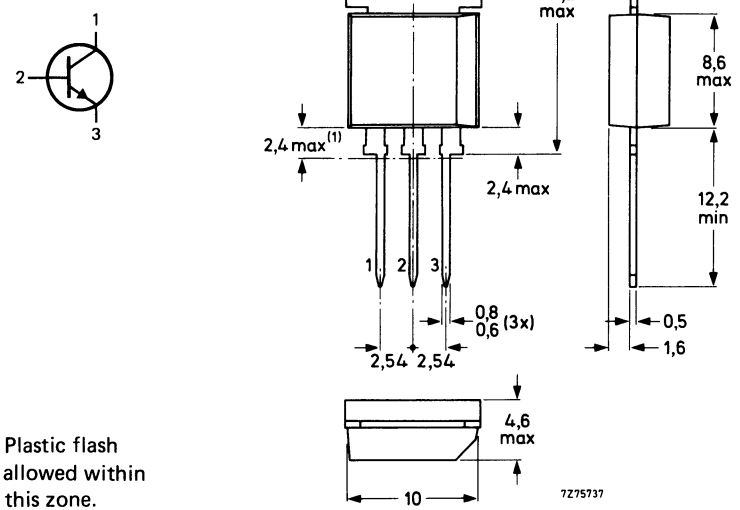
QUICK REFERENCE DATA

			BF591	BF593	
Collector-emitter voltage (open base)	V_{CEO}	max.	170	210	V
Collector-base voltage (open emitter)	V_{CBO}	max.	210	250	V
Collector current	I_C	max.	150		mA
Total power dissipation up to T_{amb} = 55 °C	P_{tot}	max.	1,3		W
Current gain					
I_C = 20 mA; V_{CE} = 5 V	$h_{FE} = h_{fe}$	min.	30		
I_C = 100 mA; V_{CE} = 6 V	$h_{FE}(h_{fe})$	min.	30(20)		
Output admittance at f = 1 kHz					
I_C = 100 mA; V_{CE} = 5 V	h_{oe}	typ.	7		mS

MECHANICAL DATA

Fig. 1 TO-202.

Dimensions in mm



(1) Plastic flash allowed within this zone.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

			BF591	BF593	
Collector-emitter voltage (open base)	V_{CEO}	max.	170	210	V
Collector-base voltage (open emitter)	V_{CBO}	max.	210	250	V
Emitter-base voltage (open collector)	V_{EBO}	max.	5		V
Collector current (d.c.)	I_C	max.	150		mA
Total power dissipation up to T_{amb} = 55 °C	P_{tot}	max.	1,3		W
Storage temperature	T_{stg}		−65 to + 150		°C
Junction temperature	T_j	max.	150		°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	max.	73		K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified			BF591	BF593	
Collector-emitter breakdown voltage open base; I_C = 10 mA	$V_{(BR)CEO}$	⩾	170	210	V
Collector-base breakdown voltage open emitter; I_C = 0,1 mA	$V_{(BR)CBO}$	⩾	210	250	V
Emitter-base breakdown voltage open collector; I_E = 0,1 mA	$V_{(BR)EBO}$	⩾	5		V
Base-emitter voltage I_C = 25 mA; V_{CE} = 5 V	V_{BE}	⩾	0,65		V
		⩽	0,85		V
Collector cut-off current open emitter; V_{CB} = 60 V	I_{CBO}	<	50		nA
V_{BE} = 0; V_{CE} = 60 V; T_j = 140 °C	I_{CES}	<	1,0		μA
D.C. current gain*					
I_C = 20 mA; V_{CE} = 5 V	h_{FE}	⩾	30		
I_C = 100 mA; V_{CE} = 6 V	h_{FE}	⩾	30		
I_C = 150 mA; V_{CE} = 7 V	h_{FE}	⩾	20		
Small-signal current gain					
I_C = 20 mA; V_{CE} = 5 V	h_{fe}	⩾	30		
I_C = 100 mA; V_{CE} = 6 V	h_{fe}	⩾	20		
Output admittance at f = 1 kHz I_C = 100 mA; V_{CE} = 5 V	h_{oe}	typ.	7		mS

* Measured under pulse conditions; t_p = 300 μs; δ = 0,01.

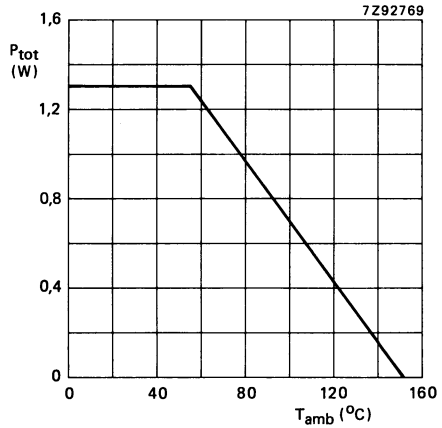


Fig. 2 Maximum permissible power dissipation.

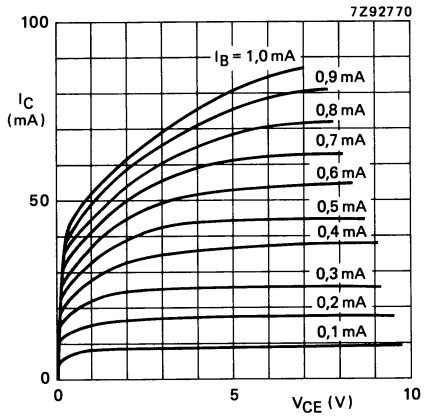


Fig. 3 T_j = 25 °C.

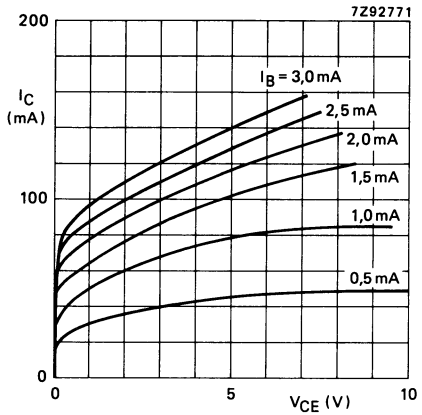


Fig. 4 T_j = 25 °C.

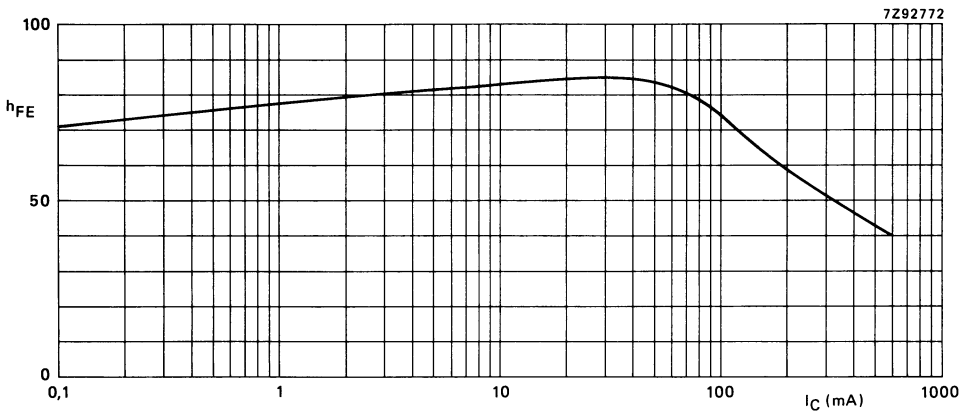


Fig. 5 T_j = 25 °C; V_{CE} = 5 V; typical values.

SILICON PLANAR TRANSISTOR

N-P-N transistor in TO-202 plastic envelope intended for use as a driver for line output transistors in colour television receivers.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	300 V
Collector-emitter voltage (open base)	V_{CEO}	max.	250 V
Collector current (peak value)	I_{CM}	max.	300 mA
Total power dissipation up to T_{mb} = 75 °C	P_{tot}	max.	6 W
Junction temperature	T_j	max.	150 °C
D.C. current gain I_C = 20 mA, V_{CE} = 10 V	h_{FE}	typ.	45
Storage time	t_s	typ.	0,5 μs

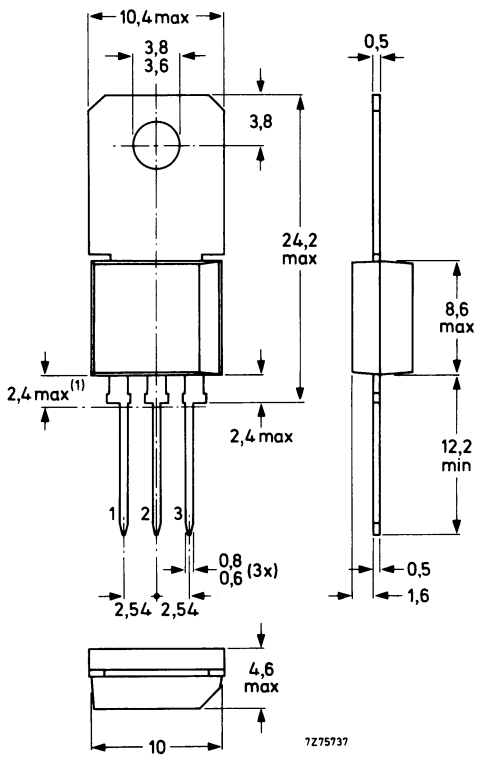
MECHANICAL DATA

Dimensions in mm

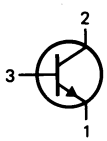
Fig. 1 TO-202.

Collector connected to mounting base.

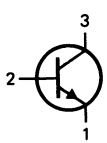
(1) Plastic flash allowed within this zone.



BF819



BF819A



BF819A is available on request. It has ebc pinning instead of ecb.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	300	V
Collector-emitter voltage (open base)	V_{CEO}	max.	250	V
Emitter-base voltage (open collector)	V_{EBO}	max.	5	V
Collector current (d.c.)	I_C	max.	100	mA
Collector current (peak value)*	I_{CM}	max.	300	mA
Base current (d.c.)	I_B	max.	50	mA
Total power dissipation up to T_{amb} = 75 °C	P_{tot}	max.	1,2	W
Total power dissipation up to T_{mb} = 75 °C	P_{tot}	max.	6	W
Storage temperature	T_{stg}	−65 to +	150	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	62,5	K/W
From junction to mounting base	$R_{th\ j\text{-}mb}$	=	12,5	K/W

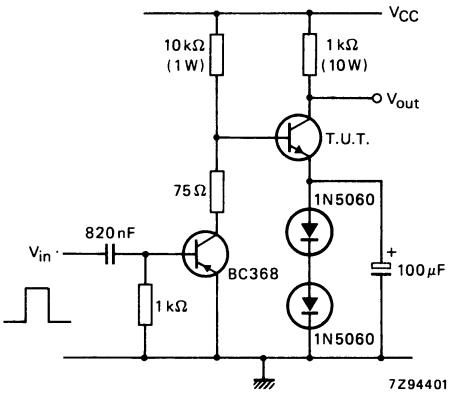
CHARACTERISTICS

T_j = 25 °C

Collector cut-off current I_E = 0; V_{CB} = 250 V	I_{CBO}	<	50	nA
Emitter cut-off current I_C = 0; V_{EB} = 3 V	I_{EBO}	<	50	nA
D.C. current gain I_C = 20 mA; V_{CE} = 10 V	h_{FE}	typ.	45	
Collector-emitter saturation voltage I_C = 200 mA; I_B = 20 mA**	V_{CEsat}	<	11	V
Collector output capacitance at f = 1 MHz I_E = 0; V_{CB} = 30 V	C_{ob}	<	4,5	pF
Storage time (see Fig. 2) I_{Con} = 100 mA; I_{Bon} = 10 mA; $-I_{Boff}$ = 20 mA	t_s	≤	1,4	μs

* Precautions should be taken during switch-on of the BF819 where an overshoot of current is likely to occur. The amplitude of the overshoot depends on the relative magnitude of stray external capacities to the transistor collector capacity. It is desirable to keep the stray capacities to a minimum by short lead lengths etc. so as to minimize the area of the switching path.

** The BF819 is controlled to V_{CEsat} max. 11,0 V and is thermally stable under all operating conditions where $T_{j\ max}$ of 150 °C is not exceeded. For the typical circuit shown in Fig. 2, a heatsink is not required for operation with $T_{amb} \leqslant 75$ °C.



V_{in} = 5 V
T = 60 μs
δ = 0,2

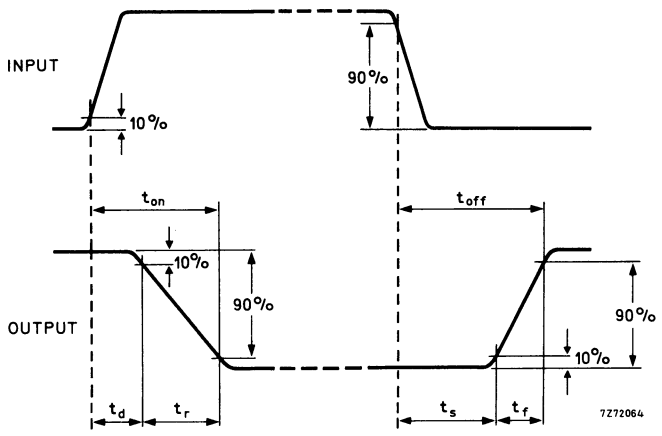


Fig. 2 Test circuit and switching waveforms.

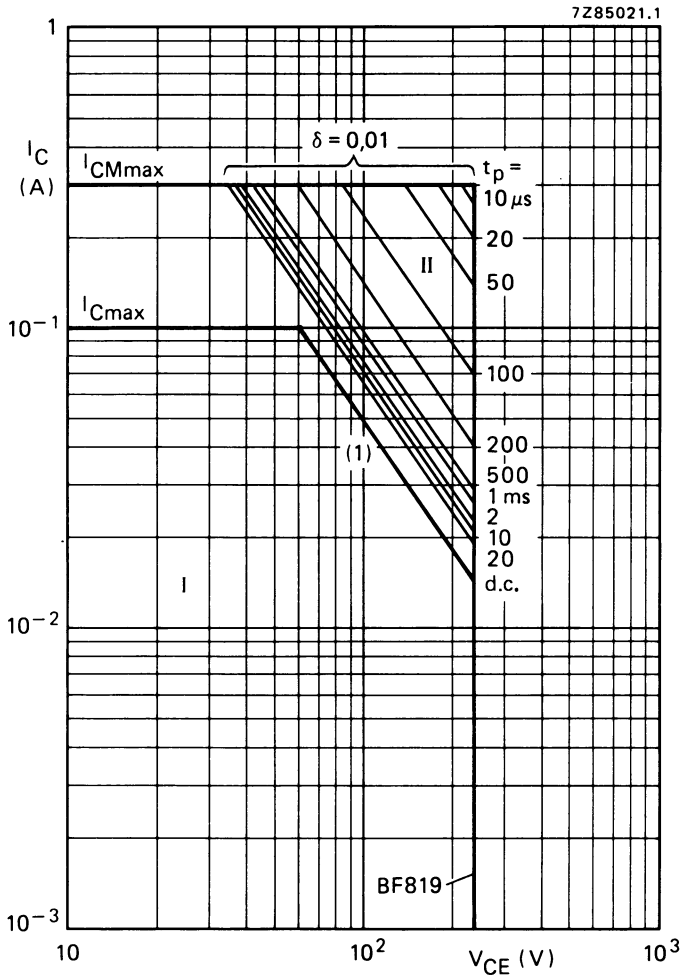


Fig. 3 Safe Operating AREa; T_{mb} = 25 °C.

I Region of permissible d.c. operation.

II Permissible extension for repetitive pulse operation.

(1) Second breakdown limits (independent of temperature).

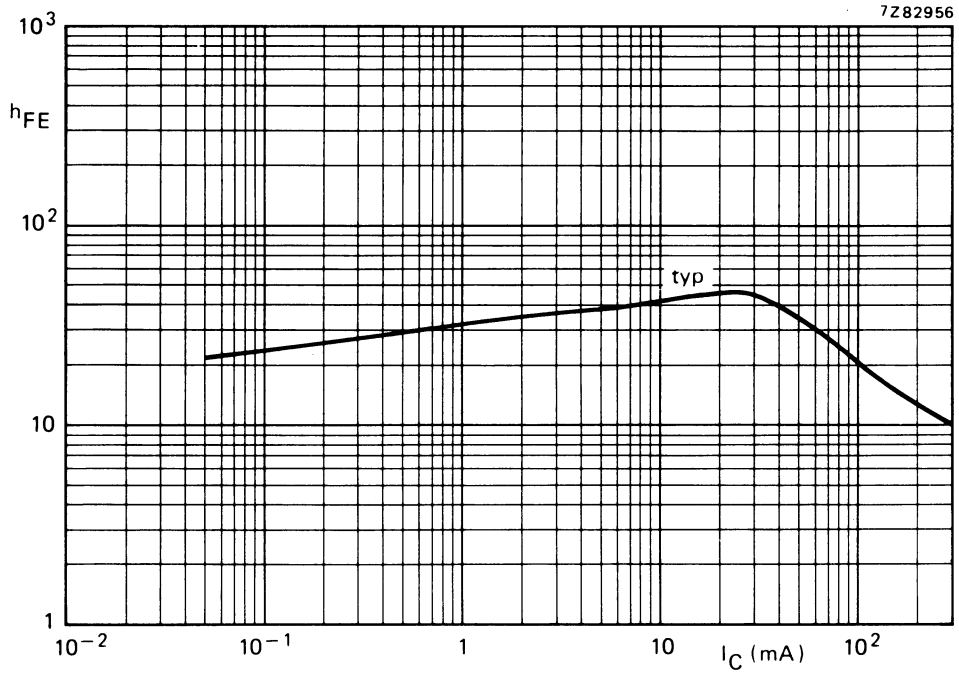


Fig. 4 D.C. current gain. V_{CB} = 10 V.

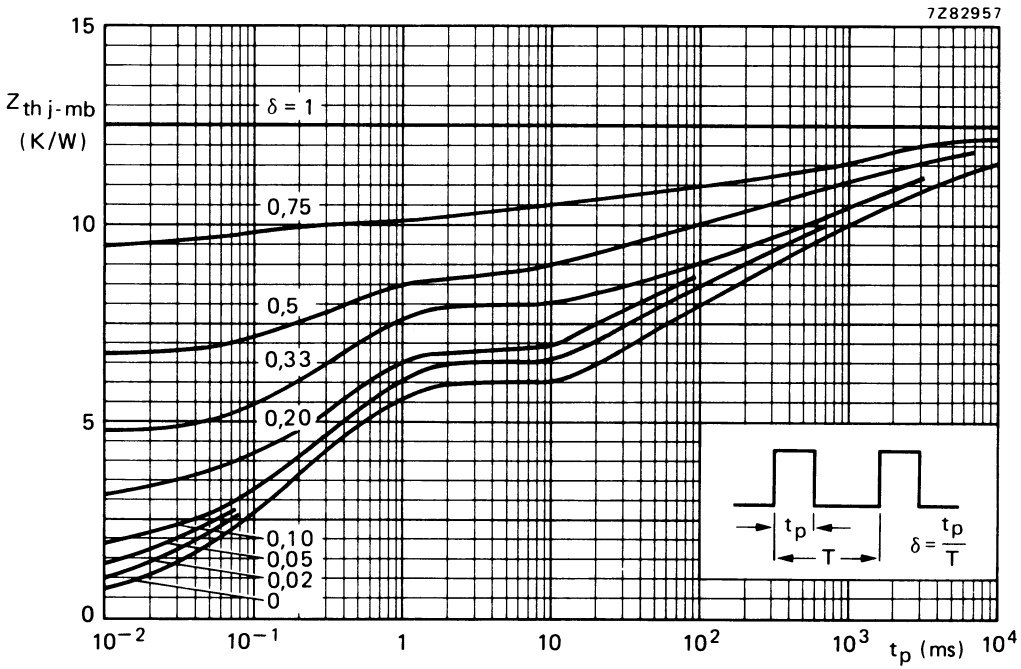


Fig. 5 Pulse power rating chart.

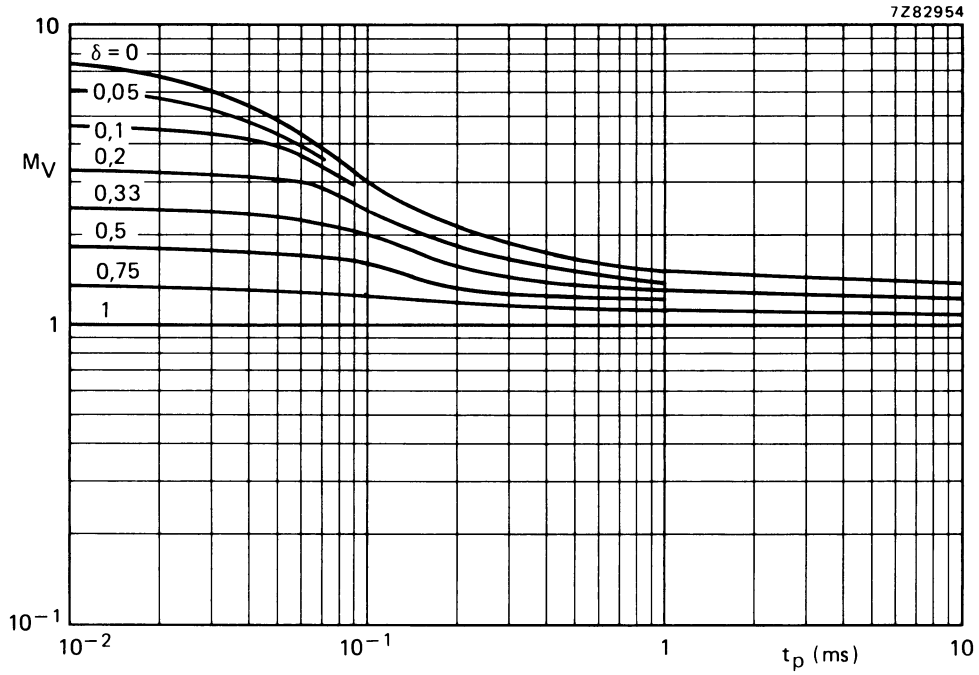


Fig. 6 S.B. voltage multiplying factor at the I_{Cmax} level.

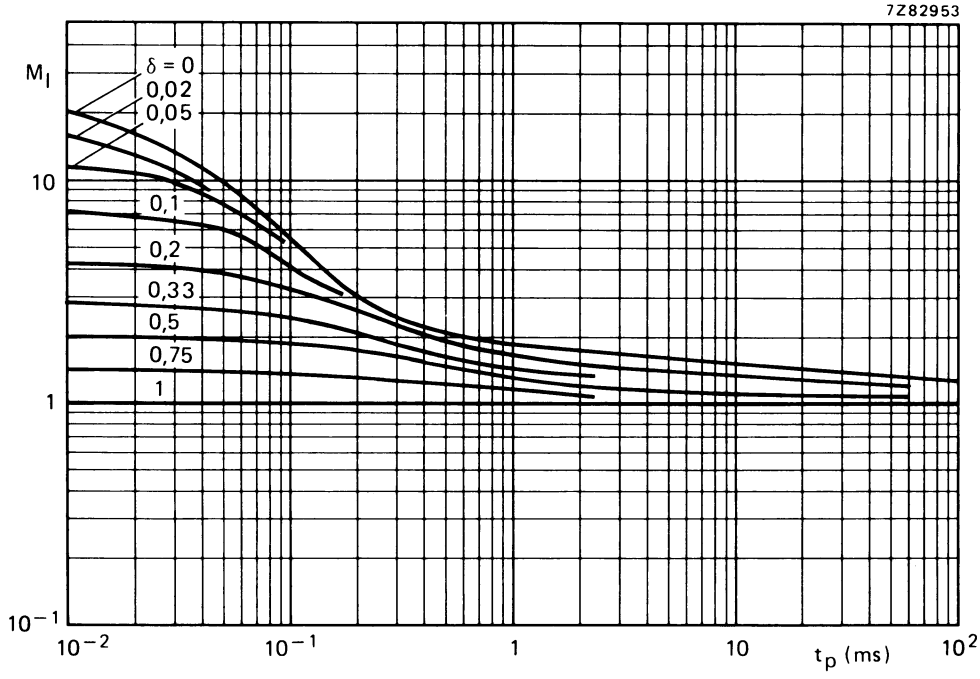


Fig. 7 S.B. current multiplying factor at the V_{CEOmax} level.

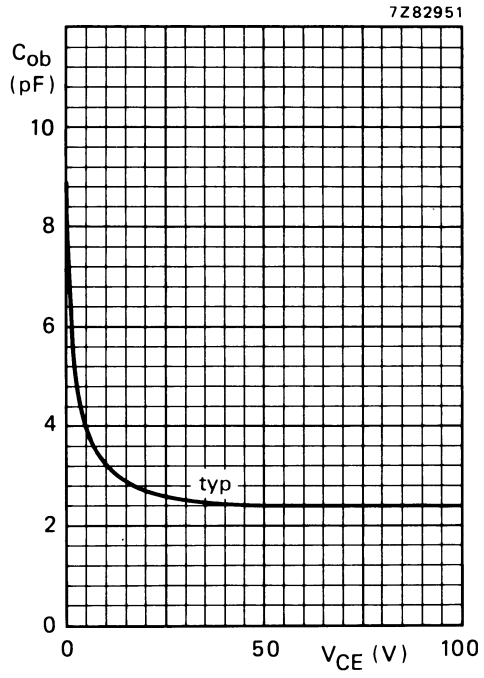


Fig. 8 Collector output capacitance
f = 1 MHz; I_E = 0.

SILICON PLANAR VIDEO OUTPUT TRANSISTORS

N-P-N transistors in TO-202 plastic envelopes intended for video output stages in black-and-white and in colour television receivers.

QUICK REFERENCE DATA

			BF857	BF858	BF859	
Collector-base voltage (open emitter)	V_{CBO}	max.	160	250	300	V
Collector-emitter voltage (open base)	V_{CEO}	max.	160	250	300	V
Collector current (peak value)	I_{CM}	max.		300		mA
Total power dissipation up to T_{mb} = 75 °C	P_{tot}	max.		6		W
Junction temperature	T_j	max.		150		°C
D.C. current gain I_C = 30 mA; V_{CE} = 10 V	h_{FE}	>		26		
Transition frequency at f = 35 MHz I_C = 15 mA; V_{CE} = 10 V	f_T	typ.		90		MHz
Feedback capacitance at f = 1 MHz I_E = 0; V_{CB} = 30 V	C_{re}	<		3		pF

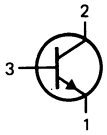
MECHANICAL DATA

Dimensions in mm

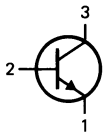
Fig. 1 TO-202.

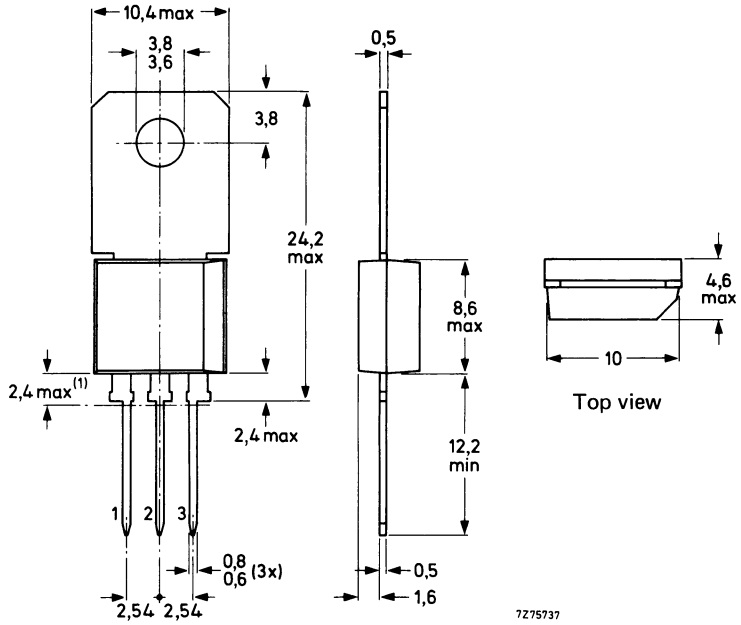
Collector connected to mounting base.

(1) Plastic flash allowed within this zone.



A-version





An A-version is available on request. It has ebc pinning instead of ecb.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

			BF857	BF858	BF859	
Collector-base voltage (open emitter)	V_{CBO}	max.	160	250	300	V
Collector-emitter voltage (open base)	V_{CEO}	max.	160	250	300	V
Emitter-base voltage (open collector)	V_{EBO}	max.	5	5	5	V
Collector current (d.c.)	I_C	max.		100		mA
Collector current (peak value)	I_{CM}	max.		300		mA
Base current (d.c.)	I_B	max.		50		mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.		2		W
Total power dissipation up to T_{mb} = 75 °C	P_{tot}	max.		6		W
Storage temperature	T_{stg}			−65 to + 150		°C
Junction temperature	T_j	max.		150		°C

THERMAL RESISTANCE

from junction to ambient in free air	$R_{th\ j\text{-}a}$	=	62,5	K/W
from junction to mounting base	$R_{th\ j\text{-}mb}$	=	12,5	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
I_E = 0; V_{CB} = 100 V for BF857	I_{CBO}	<	0,1	μA
I_E = 0; V_{CB} = 200 V for BF858	I_{CBO}	<	0,1	μA
I_E = 0; V_{CB} = 250 V for BF859	I_{CBO}	<	0,1	μA
Emitter cut-off current				
I_C = 0; V_{EB} = 5 V	I_{EBO}	<	100	μA
D.C. current gain				
I_C = 30 mA; V_{CE} = 10 V	h_{FE}	>	26	
Collector-emitter saturation voltage				
I_C = 30 mA; I_B = 6 mA	V_{CEsat}	<	1	V
Transition frequency at f = 35 MHz				
I_C = 15 mA; V_{CE} = 10 V	f_T	typ.	90	MHz
Feedback capacitance at f = 1 MHz				
I_E = 0; V_{CB} = 30 V	C_{re}	<	3	pF

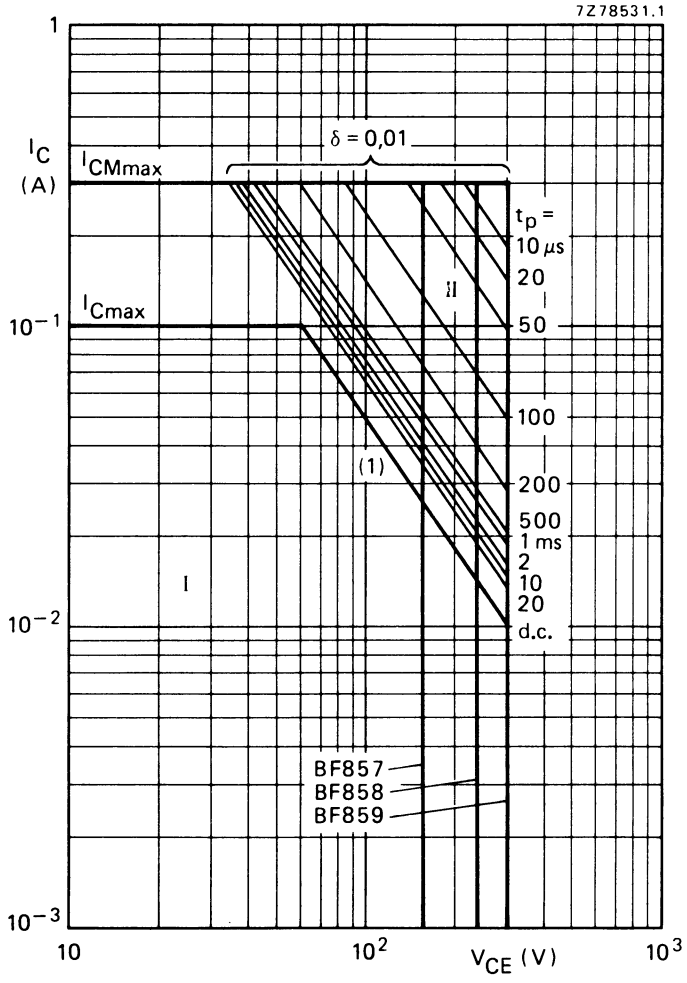


Fig. 2 Safe Operating ARea; T_{mb} = 75 °C.

I Region of permissible d.c. operation.

II Permissible extension for repetitive pulse operation.

(1) Second-breakdown limits (independent of temperature).

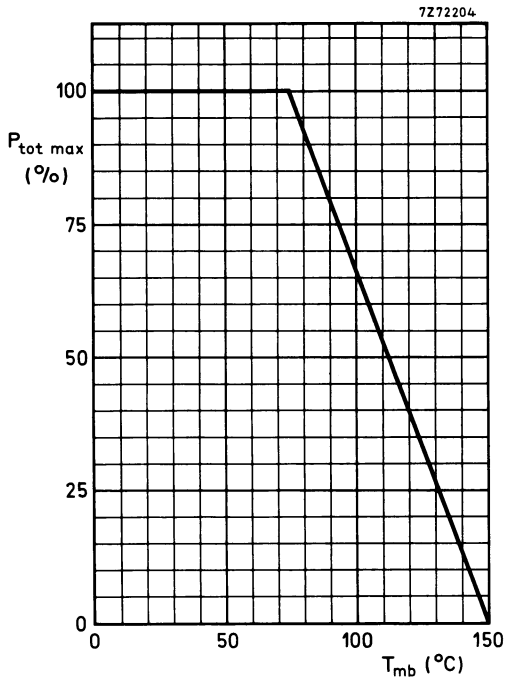


Fig. 3 Power derating curve.

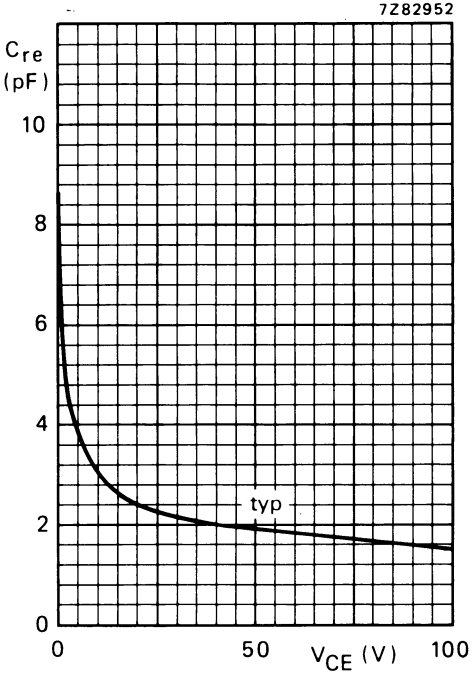


Fig. 4 Feedback capacitance f = 1 MHz.

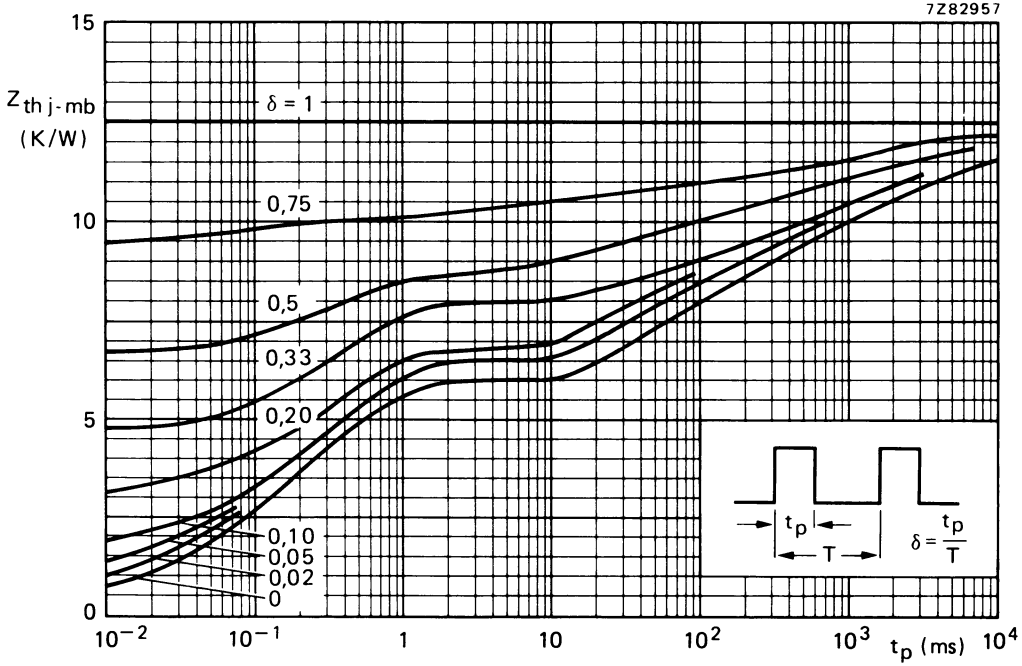


Fig. 5 Pulse power rating chart.

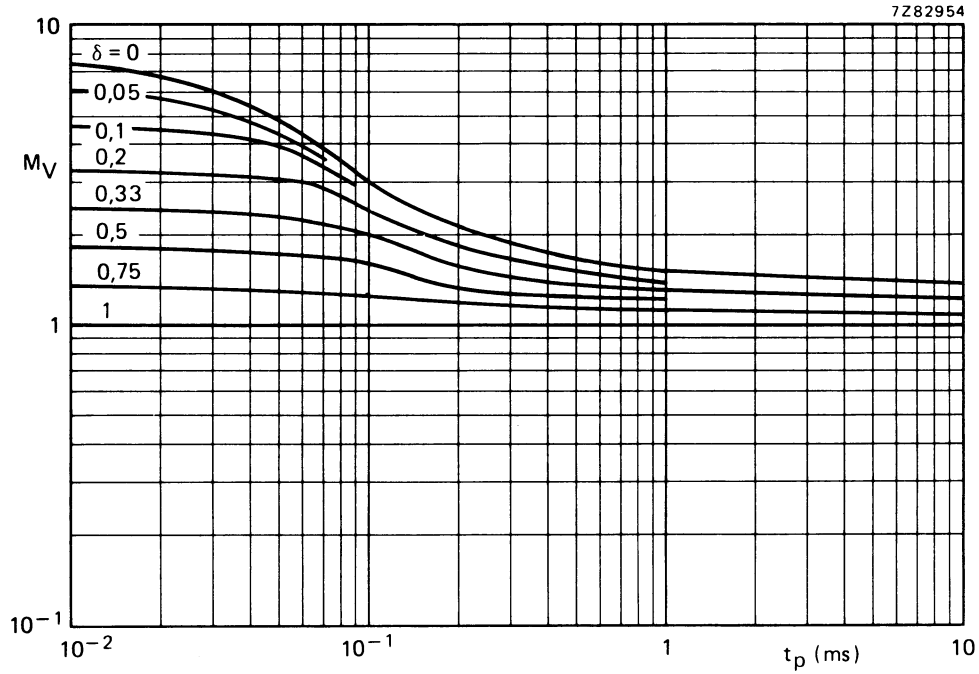


Fig. 6 S.B. voltage multiplying factor at the I_{Cmax} level.

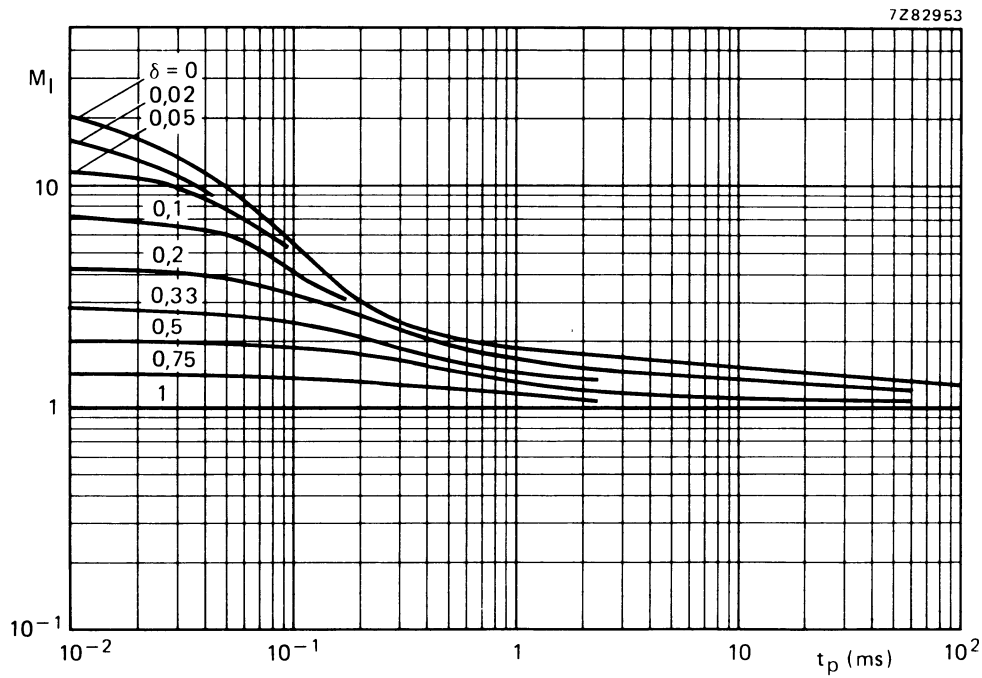


Fig. 7 S.B. current multiplying factor at the V_{CEmax} level.

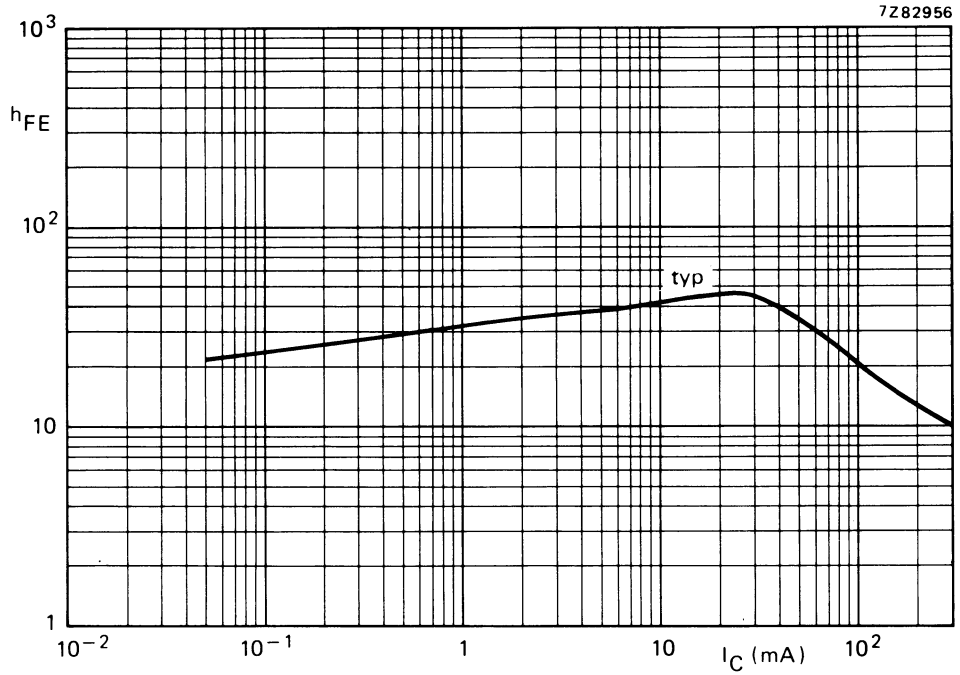


Fig. 8 D.C. current gain. V_{CE} = 10 V.

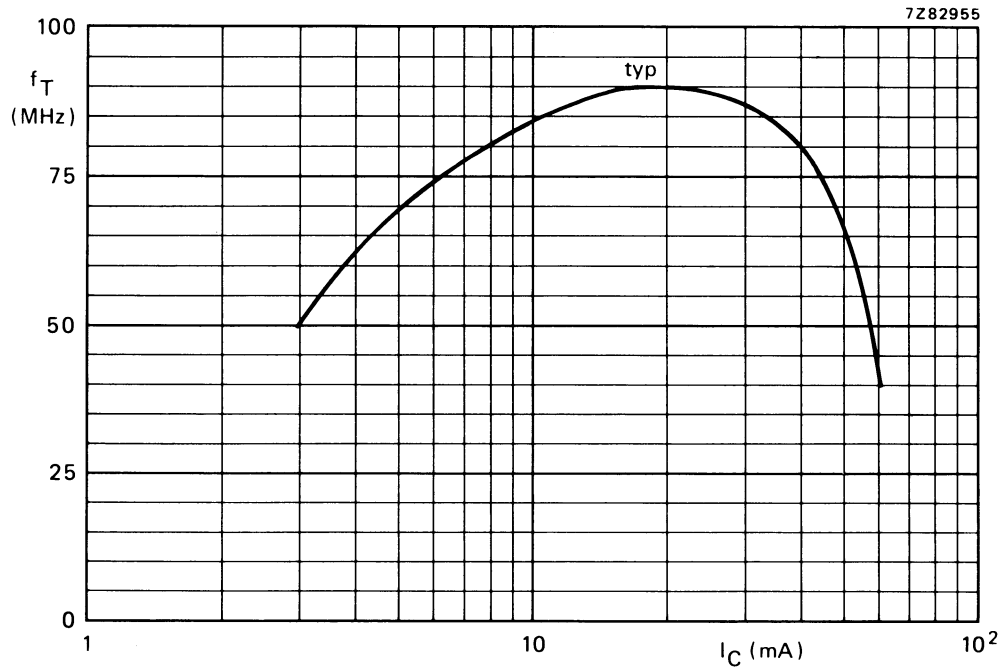


Fig. 9 Transition frequency. V_{CE} = 10 V; f = 35 MHz.

SILICON PLANAR VIDEO OUTPUT TRANSISTORS

N-P-N transistors in a TO-202 plastic envelope intended for class-B video output stages in colour television receivers. P-N-P complements are BF870 and BF872.

QUICK REFERENCE DATA

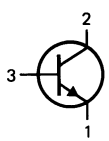
			BF869	BF871	
Collector-base voltage (open emitter)	V_{CBO}	max.	250	300	V
Collector-emitter voltage (open base)	V_{CEO}	max.	250	–	V
Collector-emitter voltage (R_{BE} = 2,7 kΩ)	V_{CER}	max.	–	300	V
Collector current (peak value)	I_{CM}	max.	100		mA
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.	5		W
Junction temperature	T_j	max.	150		°C
D.C. current gain I_C = 25 mA; V_{CE} = 20 V; T_j = 25 °C	h_{FE}	>	50		
Transition frequency $-I_E$ = 10 mA; V_{CB} = 10 V	f_T	>	60		MHz
Feedback capacitance at f = 1 MHz I_E = 0; V_{CB} = 30 V	C_{re}	<	2		pF

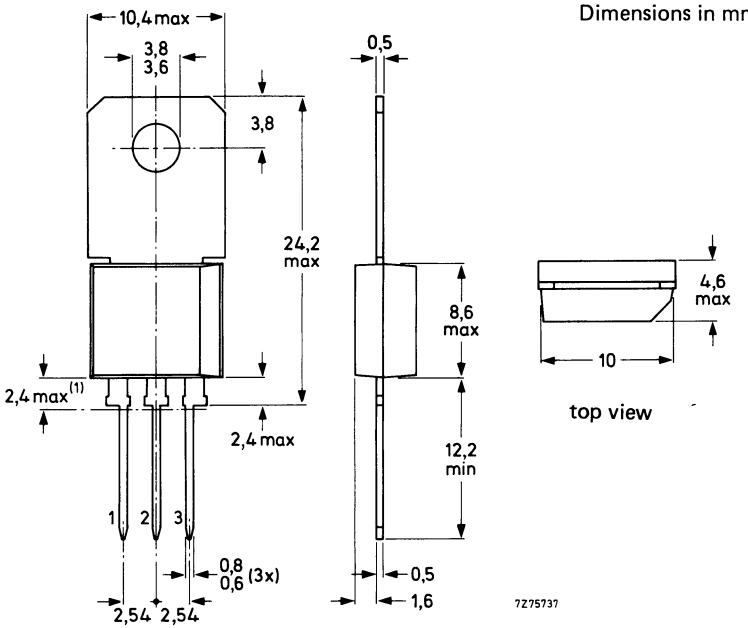
MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-202.

Collector connected to mounting base.





(1) Plastic flash allowed within this zone.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

			BF869	BF871	
Collector-base voltage (open emitter)	V_{CBO}	max.	250	300	V
Collector-emitter voltage (open base)	V_{CEO}	max.	250	–	V
Collector-emitter voltage (R_{BE} = 2,7 kΩ)	V_{CER}	max.	–	300	V
Emitter-base voltage (open collector)	V_{EBO}	max.	5		V
Collector current (d.c.)	I_C	max.	50		mA
Collector current (peak value)	I_{CM}	max.	100		mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1,6		W
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.	5		W
Storage temperature	T_{stg}		−65 to +150		°C
Junction temperature	T_j	max.	150		°C

THERMAL RESISTANCE

From junction to ambient	$R_{th\ j\text{-}a}$	=	78	K/W
From junction to mounting base	$R_{th\ j\text{-}mb}$	=	25	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified			BF869	BF871	
Collector cut-off current					
I_E = 0; V_{CB} = 200 V	I_{CBO}	<	10	10	nA
R_{BE} = 2,7 kΩ; V_{CE} = 300 V	I_{CER}	<	–	1	μA
R_{BE} = 2,7 kΩ; V_{CE} = 200 V; T_j = 150 °C	I_{CER}	<	10		μA
Emitter cut-off current					
I_C = 0; V_{EB} = 5 V	I_{EBO}	<	10		μA
D.C. current gain					
I_C = 25 mA; V_{CE} = 20 V	h_{FE}	>	50		
Base-emitter voltage					
I_C = 25 mA; V_{CE} = 20 V	V_{BE}	typ.	0,75		V
High frequency knee voltage					
I_C = 25 mA; T_j = 150 °C	V_{CEK}	typ.	20		V
Transition frequency					
$-I_E$ = 10 mA; V_{CB} = 10 V	f_T	>	60		MHz
Feedback capacitance at f = 1 MHz					
I_E = 0; V_{CB} = 30 V	C_{re}	<	2		pF

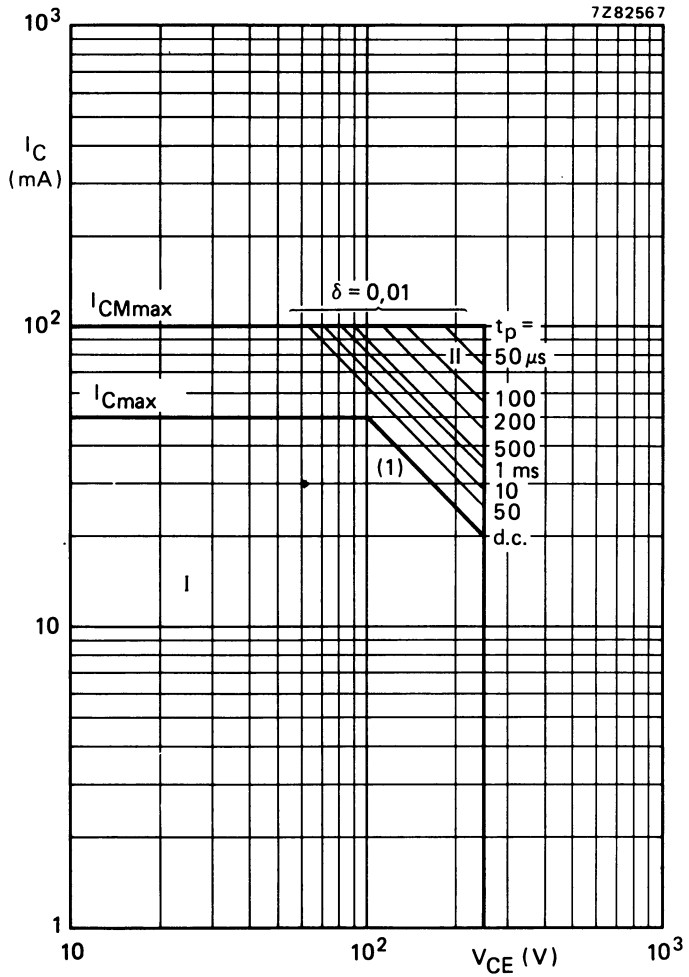


Fig. 2 Safe Operating ARea at T_{mb} = 25 °C.

I Region of permissible d.c. operation.
II Permissible extension for repetitive pulse operation.

(1) $P_{tot\ max}$ and $P_{tot\ peak\ max}$ lines.

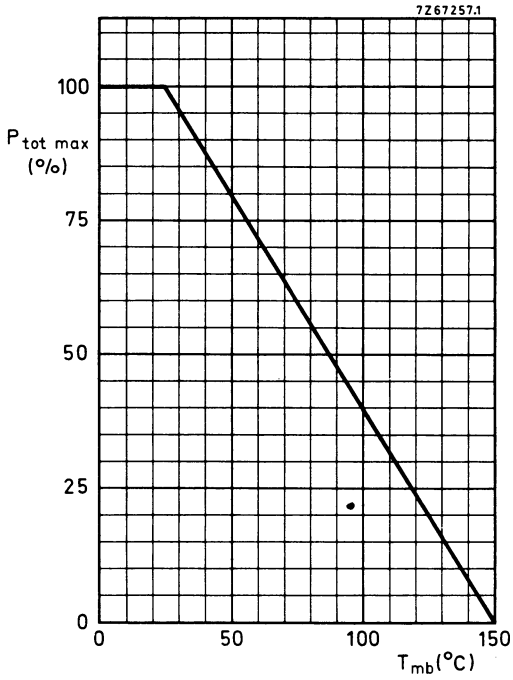


Fig. 3 Power derating curve.

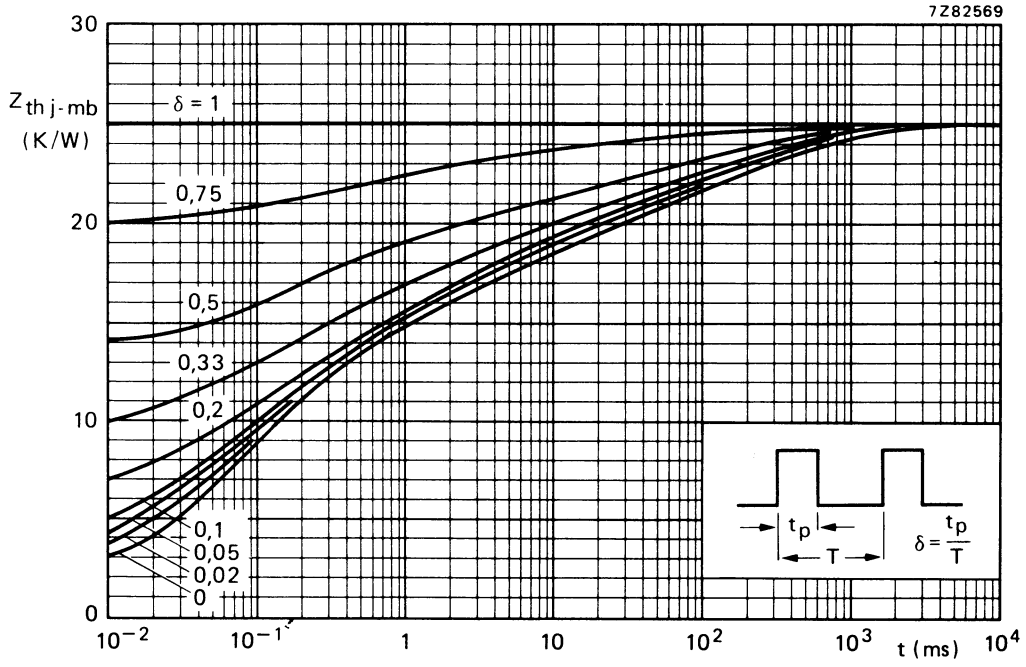


Fig. 4 Pulse power rating chart.

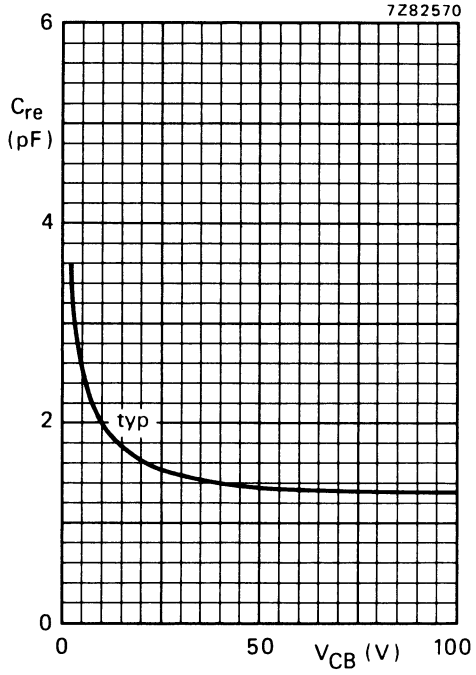


Fig. 5 $I_E = 0$; f = 1 MHz; $T_j = 25\ ^oC$.

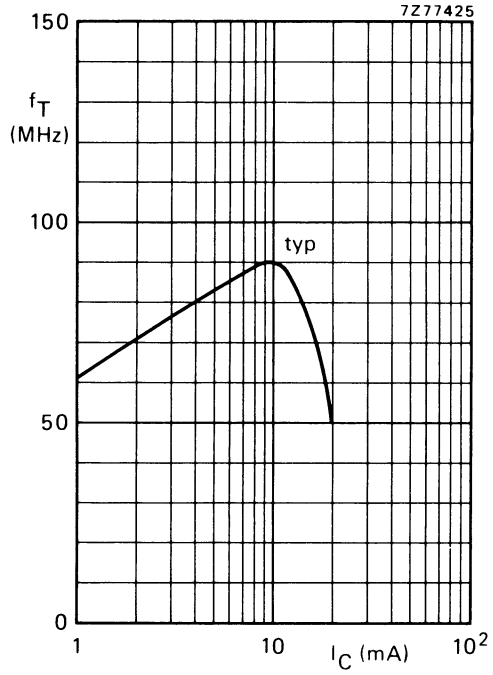


Fig. 6 $V_{CE} = 10$ V; $T_j = 25\ ^oC$.

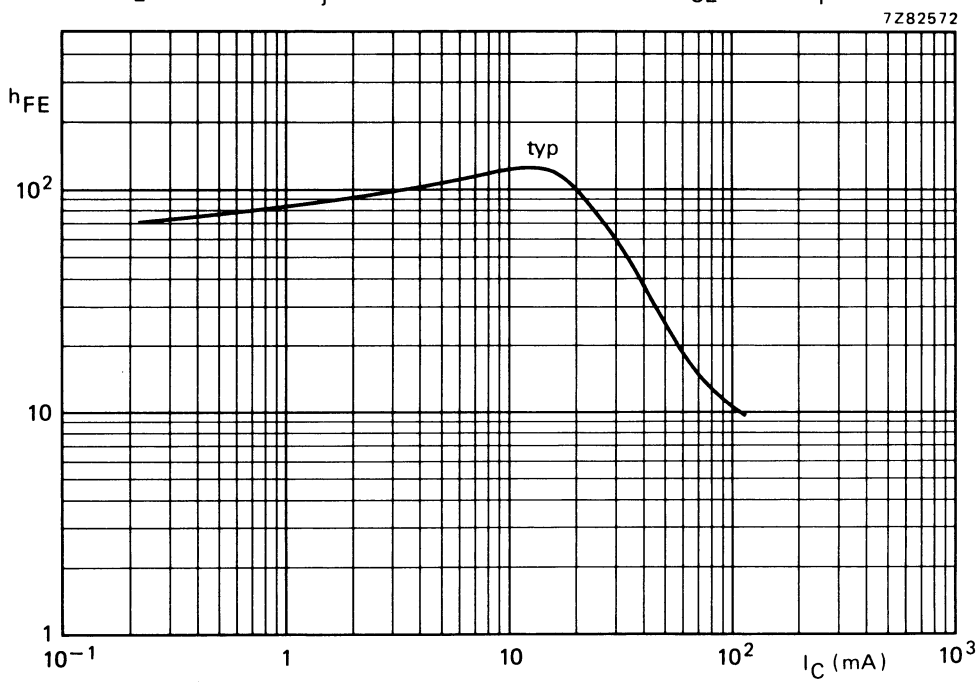


Fig. 7 D.C. current gain at $V_{CE} = 20$ V; $T_{amb} = 25\ ^oC$.

SILICON PLANAR VIDEO OUTPUT TRANSISTORS

P-N-P transistors in a TO-202 plastic envelope intended for class-B video output stages in colour television receivers. N-P-N complements are BF869 and BF871.

QUICK REFERENCE DATA

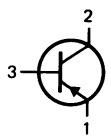
			BF870	BF872	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	250	300	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	250	–	V
Collector-emitter voltage (R_{BE} = 2,7 kΩ)	$-V_{CER}$	max.	–	300	V
Collector current (peak value)	$-I_{CM}$	max.	100		mA
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.	5		W
Junction temperature	T_j	max.	150		°C
D.C. current gain $-I_C$ = 25 mA; $-V_{CE}$ = 20 V; T_j = 25 °C	h_{FE}	>	50		
Transition frequency I_E = 10 mA; $-V_{CB}$ = 10 V	f_T	>	60		MHz
Feedback capacitance at f = 1 MHz I_E = 0; $-V_{CB}$ = 30 V	C_{re}	<	2,2		pF

MECHANICAL DATA

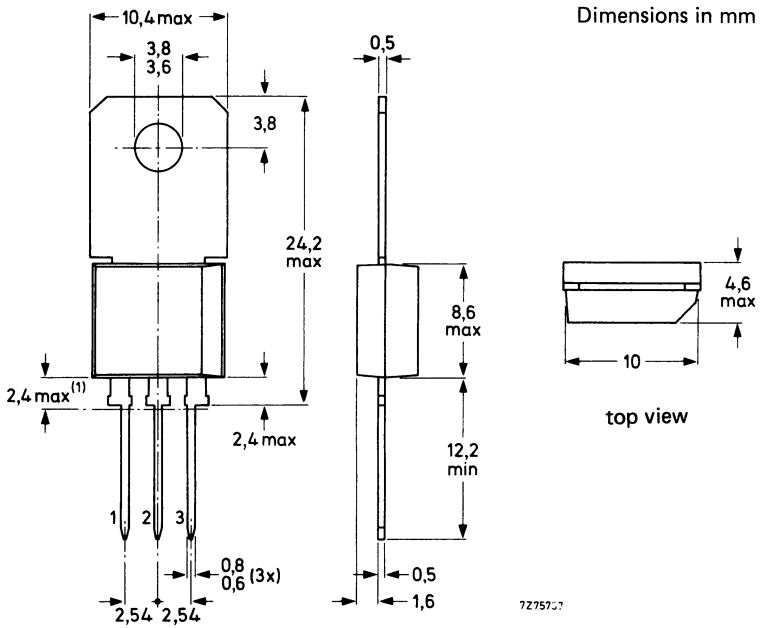
Dimensions in mm

Fig. 1 TO-202.

Collector connected to mounting base.



(1) Plastic flash allowed within this zone.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

			BF870	BF872	
Collector-base voltage (open emitter)	$-V_{CBO}$	max.	250	300	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	250	–	V
Collector-emitter voltage (R_{BE} = 2,7 kΩ)	$-V_{CER}$	max.	–	300	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	5		V
Collector current (d.c.)	$-I_C$	max.	50		mA
Collector current (peak value)	$-I_{CM}$	max.	100		mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1,6		W
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.	5		W
Storage temperature	T_{stg}		−65 to +150		°C
Junction temperature	T_j	max.	150		°C

THERMAL RESISTANCE

From junction to ambient	$R_{th\ j\text{-}a}$	=	78	K/W
From junction to mounting base	$R_{th\ j\text{-}mb}$	=	25	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified			BF870	BF872	
Collector cut-off current					
I_E = 0; $-V_{CB}$ = 200 V	$-I_{CBO}$	<	10	10	nA
R_{BE} = 2,7 kΩ; $-V_{CE}$ = 300 V	$-I_{CER}$	<	–	1	μA
R_{BE} = 2,7 kΩ; $-V_{CE}$ = 200 V; T_j = 150 °C	$-I_{CER}$	<	10		μA
Emitter cut-off current					
I_C = 0; $-V_{EB}$ = 5 V	$-I_{EBO}$	<	10		μA
D.C. current gain					
$-I_C$ = 25 mA; $-V_{CE}$ = 20 V	h_{FE}	>	50		
Base emitter voltage					
$-I_C$ = 25 mA; $-V_{CE}$ = 20 V	$-V_{BE}$	typ.	0,75		V
High-frequency knee voltage					
$-I_C$ = 25 mA; T_j = 150 °C	$-V_{CEK}$	typ.	20		V
Transition frequency					
I_E = 10 mA; $-V_{CB}$ = 10 V	f_T	>	60		MHz
Feedback capacitance at f = 1 MHz					
I_E = 0; $-V_{CB}$ = 30 V	C_{re}	<	2,2		pF

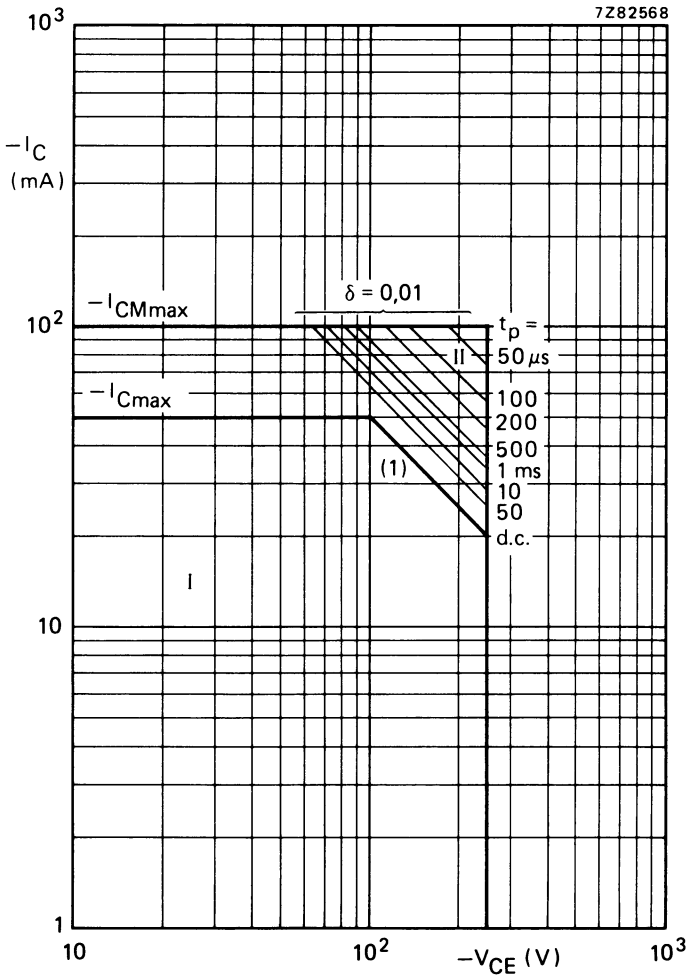


Fig. 2 Safe Operating ARea; T_{mb} = 25 °C.

I Region of permissible d.c. operation.
II Permissible extension for repetitive pulse operation.
(1) $P_{tot\ max}$ and $P_{tot\ peak\ max}$ lines.

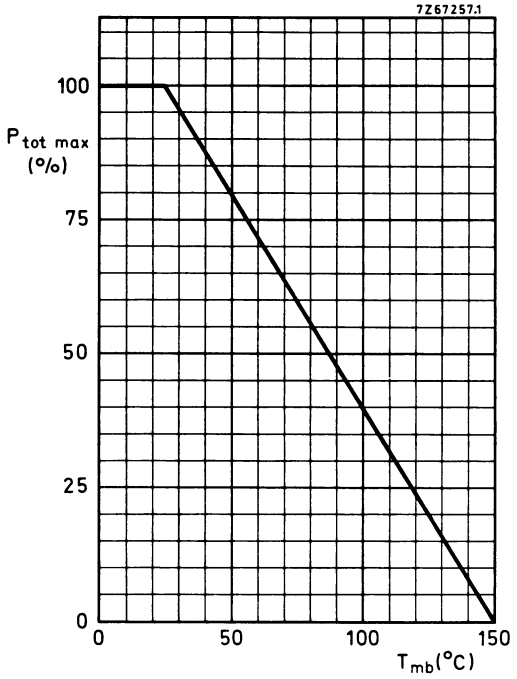


Fig. 3 Power derating curve.

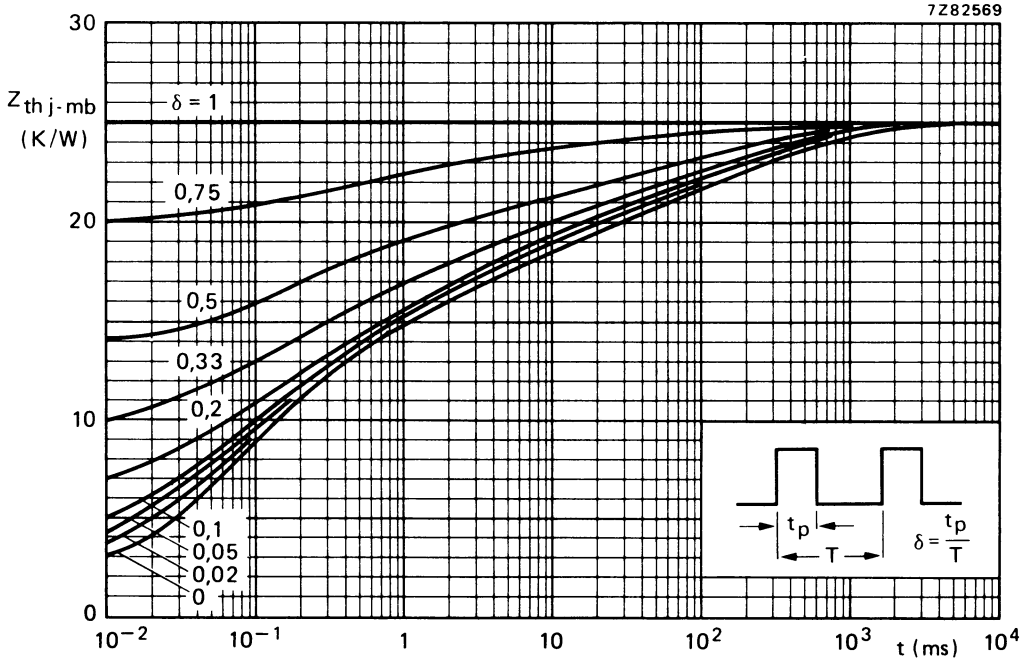


Fig. 4 Pulse power rating chart.

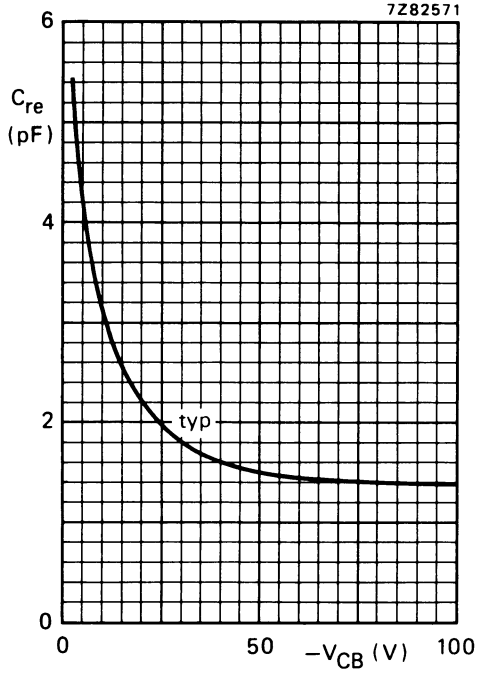


Fig. 5 $I_E = 0$; f = 1 MHz; $T_{amb} = 25\ ^oC$.

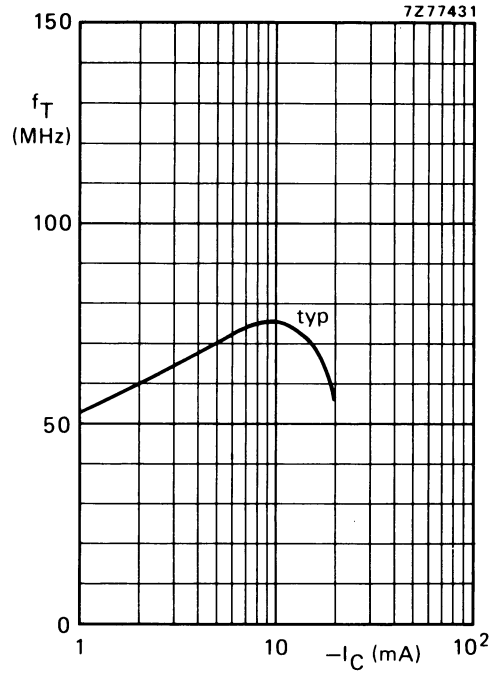


Fig. 6 $-V_{CE} = 10$ V; $T_j = 25\ ^oC$.

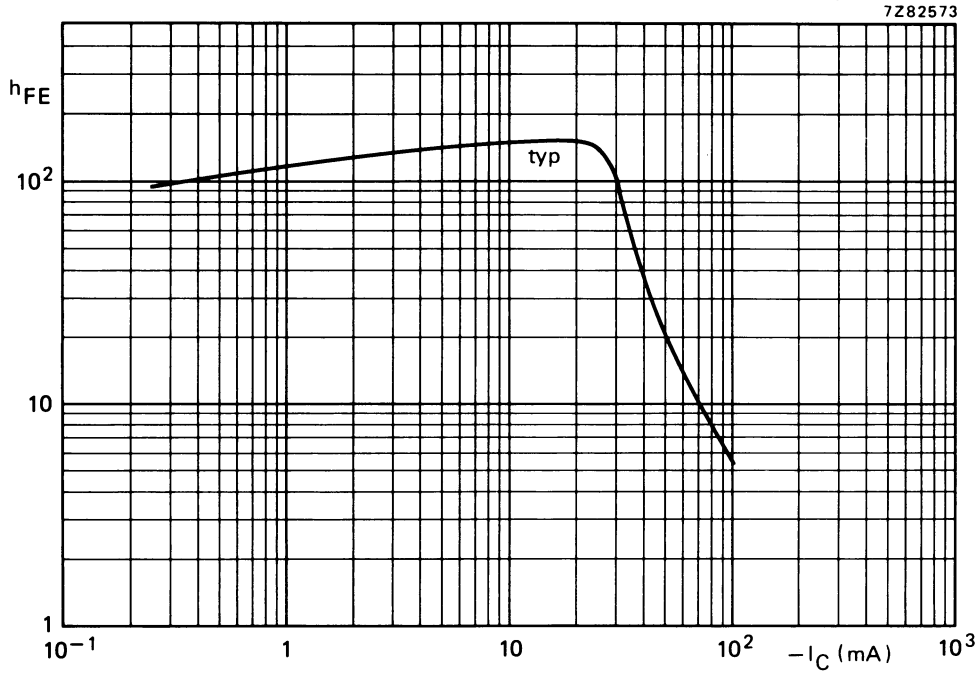


Fig. 7 D.C. current gain at $-V_{CE} = 20$ V; $T_{amb} = 25\ ^oC$.

SILICON DARLINGTON POWER TRANSISTORS

High voltage n-p-n Darlington circuit with integrated speed-up diode in a plastic TO-220 envelope for industrial fast switching applications and horizontal deflection circuits of monitors and b/w television receivers.

QUICK REFERENCE DATA

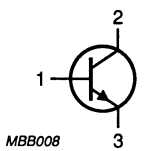
			BU806	BU807	
Collector-base voltage (open emitter)	V_{CBO}	max.	400	330	V
Collector-emitter voltage (V_{EB} = 6 V)	V_{CEX}	max.	400	330	V
Collector-emitter voltage (open base)	V_{CEO}	max.	200	150	V
Collector current (d.c.)	I_C	max.	8		A
Collector current (peak value) t_p = 0,3 ms; δ = 10%	I_{CM}	max.	15		A
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.	60		W
Junction temperature	T_j	max.	150		°C
Fall time I_{Con} = 5 A; I_{Bon} = 50 mA; $-I_{Boff}$ = 500 mA	t_f	typ.	0,2		μs

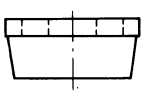
MECHANICAL DATA

Dimensions in mm

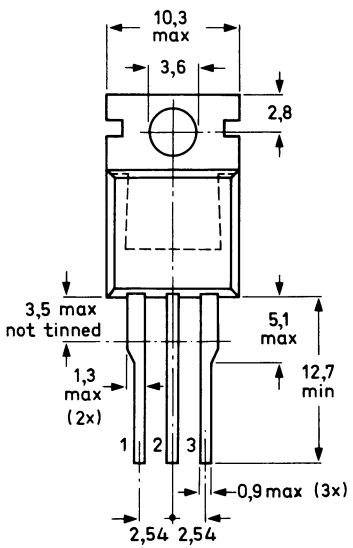
Fig. 1 TO-220AB.

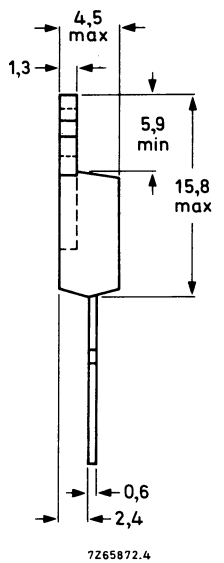
Collector connected to mounting base.





top view





See also chapters Mounting instructions and Accessories.

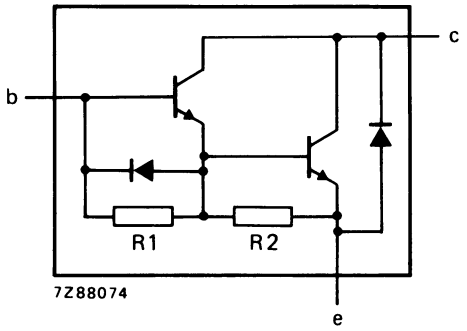


Fig. 2 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC134)

			BU806	BU807	
Collector-base voltage (open emitter)	V_{CBO}	max.	400	330	V
Collector-emitter voltage (V_{EB} = 6 V)	V_{CEX}	max.	400	330	V
Collector-emitter voltage (open base)	V_{CEO}	max.	200	150	V
Emitter-base voltage (open collector)	V_{EBO}	max.	6		V
Collector current (d.c.)	I_C	max.	8		A
Collector current (peak value) t_p = 0,3 ms; δ = 0,1	I_{CM}	max.	15		A
Base current (d.c.)	I_B	max.	100		mA
Total power dissipation up to T_{mb} = 25 °C	P_{tot}	max.	60		W
Storage temperature	T_{stg}		−65 to + 150		°C
Junction temperature*	T_j	max.	150		°C

THERMAL RESISTANCE*

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	2,08	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current**					
$V_{CE} = V_{CESmax}$; V_{BE} = 0	I_{CES}	<	100		μA
$V_{CE} = V_{CEXmax}$; V_{EB} = 6 V	I_{CEX}	<	100		μA
Emitter cut-off current I_C = 0; V_{EB} = 6 V	I_{EBO}	<	3		mA
			BU806	BU807	
Collector-emitter sustaining voltage I_C = 100 mA; I_{Boff} = 0; L = 25 mH	$V_{CEOsust}$	>	200	150	V

* Based on maximum average junction temperature in line with common industrial practice. The resulting higher junction temperature of the output transistor part is taken into account.

** Measured with a half sine wave voltage (curve tracer).

Saturation voltages

I_C = 5 A; I_B = 50 mA

V_{CEsat} < 1,5 V
V_{BEsat} < 2,8 V

Diode, forward voltage

I_F = 4 A

V_F < 2 V

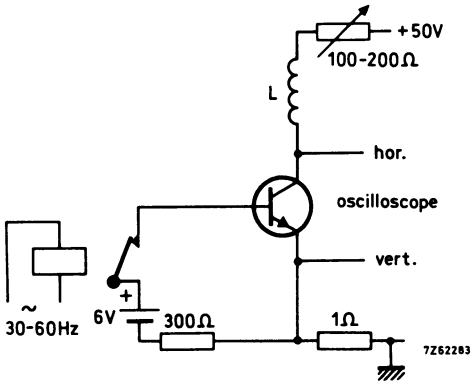


Fig. 3 Test circuit for $V_{CEOsust}$.

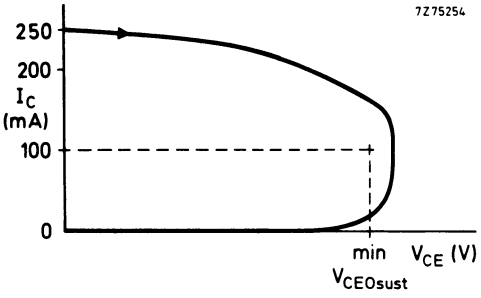


Fig. 4 Oscilloscope display for $V_{CEOsust}$.

Switching times (between 10% and 90% levels)

I_{Con} = 5 A; V_{CC} = 100 V

I_{Bon} = 50 mA; $-I_{Boff}$ = 500 mA

Turn-on time t_{on} typ. 0,35 μs

Turn-off time: Storage time t_s typ. 0,55 μs

Fall time t_f typ. 0,2 μs

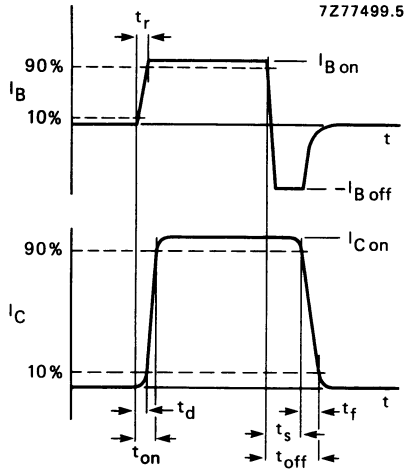


Fig. 5 Waveforms.

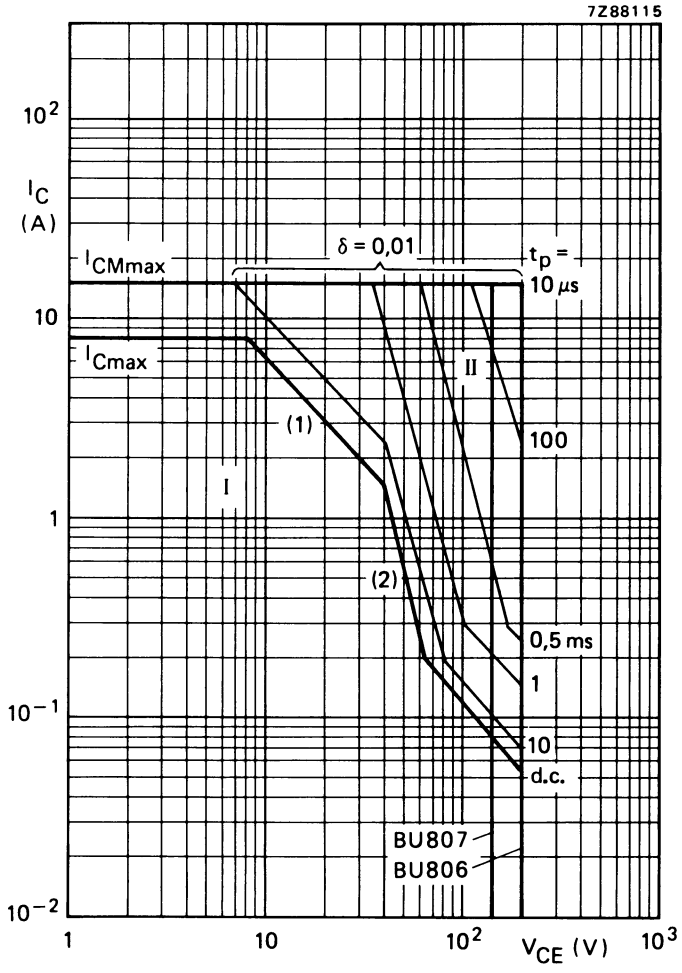


Fig. 6 D.C. Safe Operating ARea.

I Region of permissible d.c. operation.
II Permissible extension for repetitive pulse operation.

(1) $P_{tot\ max}$ and $P_{tot\ peak\ max}$ lines.
(2) Second breakdown limits (independent of temperature).

SILICON EPITAXIAL POWER TRANSISTORS

NPN Darlington power transistors in a SOT186 envelope with an electrically isolated seating plane.

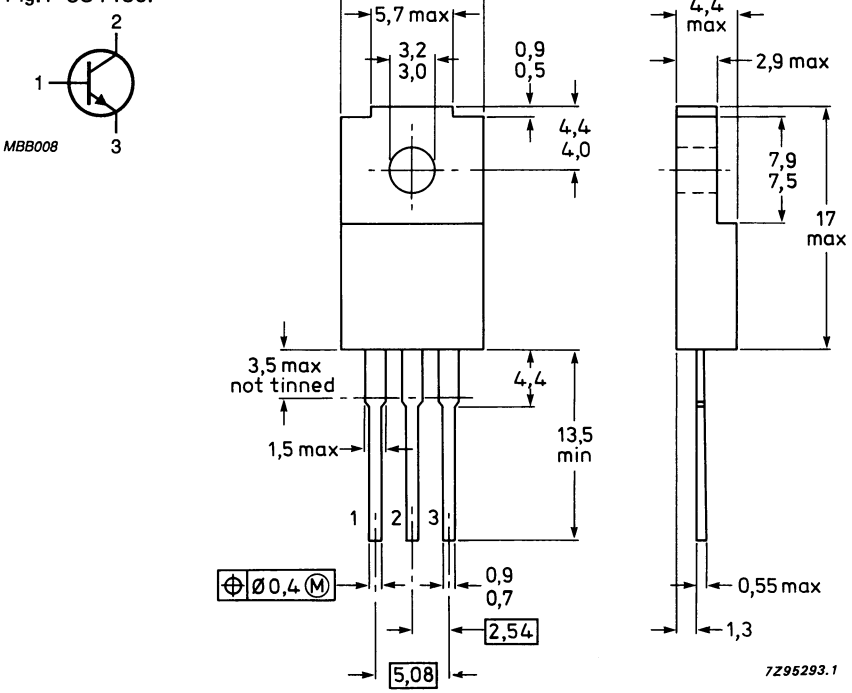
QUICK REFERENCE DATA

			BU806F	BU806AF	BU807F	
Collector-base voltage (open emitter)	V_{CBO}	max.	400	400	330	V
Collector-emitter voltage (open base)	V_{CEO}	max.	200	180	150	V
Emitter-base voltage (open collector)	V_{EBO}	max.		6		V
Collector current						
DC	I_C	max.		8		A
peak value	I_{CM}	max.		15		A
Total power dissipation up to T_h = 25 °C	P_{tot}	max.		28		W

MECHANICAL DATA

Dimensions in mm

Fig.1 SOT186.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

			BU806F	BU806AF	BU807F	
Collector-base voltage (open emitter)	V_{CBO}	max.	400	400	330	V
Collector-emitter voltage (open base)	V_{CEO}	max.	200	180	150	V
Emitter-base voltage (open collector)	V_{EBO}	max.		6		V
Collector current						
DC	I_C	max.		8		A
peak value	I_{CM}	max.		15		A
Base current (DC)	I_B	max.		2		A
Total power dissipation						
up to T_h = 25 °C (1)	P_{tot}	max.		18		W
up to T_h = 25 °C (2)	P_{tot}	max.		28		W
Storage temperature	T_{stg}	max.		−65 to 150		°C
Junction temperature	T_j	max.		150		°C

THERMAL RESISTANCE

From junction to internal heatsink	$R_{th\ j\text{-}mb}$	max.	2	K/W
From junction to external heatsink (1)	$R_{th\ j\text{-}h}$	max.	7	K/W
From junction to external heatsink (2)	$R_{th\ j\text{-}h}$	max.	4.5	K/W

INSULATION

Voltage allowed between all terminals and external heatsink, peak value	V_{insul}	max.	1500	V

CHARACTERISTICS

Collector-emitter saturation voltage I_C = 5 A; I_B = 50 mA	V_{CEsat}	⩽	1.5	V

(1) Mounted without heatsink compound and 30 ± 5 N pressure on centre of envelope.
(2) Mounted with heatsink compound and 30 ± 5 N pressure on centre of envelope.

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